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PANEL DISCUSSION ON CYANOSIS OF THE NEWBORN*

INTRODUCTION

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BOSTON

THE essential cause of cyanosis has been shown to be the presence in the capillary blood of excessive amounts of reduced (unoxygenated) hemoglobin, methemoglobin or sulfhemoglobin.

The speakers today will probably refer only to cyanosis due to oxygen unsaturation which results in the presence of reduced hemoglobin in the blood, inasmuch as the other types — methemoglobinemia and sulfhemoglobinemia — are infrequent in the newborn period.

Thus cyanosis as we shall consider it is a bluish discoloration of the skin due to oxygen unsaturation of the blood. This does not have the same significance as anoxemia, a condition in which there is actual oxygen want in the tissue cells. Although cyanosis usually indicates oxygen deficiency with respect to the body cells, such is not always the case. Under certain sets of circumstances anoxemia may be present without cyanosis, and conversely cyanosis can be present without anoxemia.

The amount of reduced hemoglobin must reach a certain level in the capillaries of the vascular system before cyanosis appears, because a certain amount is needed to produce the blue color. Venous blood is blue and shows through over the large veins, but this does not mean cyanosis. About 5 gm. of reduced hemoglobin per 100 cc. of capillary blood is necessary to produce the bluish appearance of the skin and mucous membranes. In other words, in a person with a normal level of hemoglobin about one third of the blood must be unsaturated with oxygen (reduced) before cyanosis appears. Reduced hemoglobin is measured in terms of oxygen unsaturation of the blood. One cubic centimeter of oxygen combines with 0.75 gm. of hemoglobin so that 5 gm. of reduced hemoglobin would equal 6.7 vol. per cent of oxygen unsaturation. A person with a low hemoglobin — particularly one of less than 5 gm. — could not well develop cyanosis.

Lundsgaard's§§ outstanding work in this field has clarified the effect of various factors contributing to the appearance of cyanosis. Four factors should be kept clearly in mind:

(1) The total hemoglobin content of the blood, which affects greatly the appearance of cyanosis. Thus a patient with a very high hemoglobin may be cyanotic and not have anoxemia, while a patient with a low hemoglobin may be suffering from anoxemia and still remain free from cyanosis.

(2) The degree of oxygen unsaturation of arterial blood coming from aerated lung areas. This is affected by the oxygen tension in air, rate and depth of respiration, permeability of alveolar walls and partial obstructions of the bronchial tree.

(3) The proportion of blood passing from the right to the left side of the heart through unaerated channels. This is affected by congenital malformations of the heart, atelectasis and lobar pneumonia.

(4) The oxygen consumption in the capillaries, which is influenced by peripheral vascular conditions.

Among other factors are vascularity, pigmentation and transparency of the skin. Because of these last factors, notably pigmentation and transparency, the amount of reduced hemoglobin in the capillary blood which will result in the appearance of cyanosis varies from 4 to 6 gm.

In Figure 1 are shown the comparative oxygen capacities and degrees of unsaturation of both arterial and venous blood of maternal and fetal circulations. It is to be noted that whereas maternal arterial blood is probably 95 per cent sat-

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§Lundsgaard, C., and Van Slyke, D. D.: Cyanosis. Medicine 2:1-76, 1923.

urated with oxygen, fetal arterial blood is to a considerable degree unsaturated, so that at the time of birth the fetus may actually have a physiologic cyanosis. However, the oxygen supply to the tissues is not inadequate because of the large

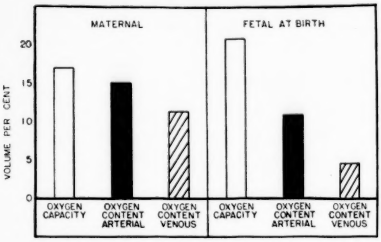

Figure 1. *Normal Oxygen Relations of Maternal and Fetal Bloods.*

This figure shows the average oxygen relations of blood in fifteen normal mothers and fifteen unanesthetized infants at birth.

amount of hemoglobin in the fetal circulation and the increased total capacity.

Table 1. *Cyanosis of the Newborn.*

PROXIMAL CAUSE	UNDERLYING CAUSES
Oxygen unsaturation of the blood due to inadequate respiratory exchange.	Cerebral disturbances: Trauma Asphyxia Medication Pulmonary disturbances: Atelectasis Obstruction Pneumonia Edema Hemorrhage Circulatory disturbances: Heart (congenital defects) Peripheral circulation

In Table 1 is shown an outline of some of the causes of cyanosis of the newborn which will be considered by the speakers who follow.

CYANOSIS FOLLOWING INTRACRANIAL INJURIES

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BROOKLINE

INTRACRANIAL injury may produce the symptom of cyanosis when there is direct or indirect involvement of the respiratory center. The respiratory center may be affected by the pressure of gross hemorrhage or of gross cerebral edema. The center may be directly injured by petechial hemorrhages or by local edema involving the medullary tissue.

The two major causes of cerebral injury are trauma and asphyxia. Either of these alone is capable of producing injury, but it is more usual to find elements of both contributing to the injury. There is in addition the important factor of individual susceptibility operating with both trauma and asphyxia. In premature infants, for instance, the soft bones of the skull afford little protection to the underlying cerebral tissue, while the supporting membranes and blood vessels of the brain are extremely delicate. As a result, a minimum of trauma or asphyxia that would exert no harmful effect on a full-term baby may in the case of a premature infant produce serious intracranial injury.

The various factors that tend to produce traumatic injury of the central nervous system are so well known that they need only be mentioned. Delivery by means of high-forceps or mid-forceps, the application of traction from below, the attempt to deliver before the cervix has been completely dilated, cephalopelvic disproportion with the necessity of delivering a large head through a small pelvis and breech extraction are all accompanied by a high incidence of traumatic injury to the central nervous system. In every case in which these factors operate in the presence of a premature infant the risk of intracranial injury is proportionately higher.

The role of asphyxia in the production of intracranial injury is less well recognized. Anoxemia produces a profound disturbance of the fetus, affecting not only the central nervous system but every organ and tissue of the body. It appears from my observations that the changes resulting from anoxemia progress in an orderly fashion through various stages. The first stage is one of congestion with intense engorgement of the veins and capillaries. The second stage is one of congestion plus edema, the edema presumably being caused by the transudation of fluid through the capillaries. In the third stage, congestion, edema and, in addition, petechial hemorrhages appear, these hemorrhages being the result either of diapedesis of red cells into the perivascular spaces or of actual rupture of the capillaries. In this stage, evidence may be found of the actual death of tissue, presumably the result of anoxemia or ischemia. The fourth stage is characterized by congestion, edema, petechial hemorrhages and gross bleeding, the latter being the result of continued capillary oozing or of rupture of small veins. As is the case with trauma, asphyxia oc-

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curring in a premature infant increases the chances that serious injury may result.

Fetal anoxemia may result from a number of factors such as premature separation of the placenta, placenta previa, tetanic uterine contraction, pituitrin injection, prolapse of the umbilical cord, a short umbilical cord or a cord wrapped tightly around the infant's neck and abnormally prolonged second stages of labor with the head on the perineum. Fetal anoxemia may also be produced by high concentration of nitrous-oxide analgesia or anesthesia.

From the practical point of view, both trauma and asphyxia are usually present with intracranial hemorrhage. In reviewing 100 autopsies on infants with intracranial hemorrhage, no case was found where the lesions could be explained on the basis of trauma alone. This statement seems reasonable when one considers that the principal indication for abnormal or operative delivery is fetal distress. It is my present belief that the primary predisposing factor in the occurrence of intracranial injury is an intrauterine asphyxia. Indeed, in the cases analyzed this condition alone was sufficient to explain at least 50 per cent of the injuries encountered. The hemorrhages associated with intrauterine asphyxia were found in the ventricles, subarachnoid system and cerebral tissue, and were accompanied by congestion, edema and degeneration of nerve tissue. When the traumatic factor is superimposed on the cerebral conditions resulting from asphyxia, rupture of the larger veins, particularly the vein of Galen, tears of the falx and tentorium and tears extending into the main sinuses of the dura may be encountered. This type of hemorrhage involves the subdural space.

The infant with intracranial injury presents a picture dependent on the etiology of the hemorrhage and its anatomical location. A slowly accumulating hemorrhage in the subdural or subarachnoid space or edema and petechial hemorrhages in the brain tissue will produce the symptoms of cerebral irritation with convulsions that may not appear for a considerable period following birth. If these changes do not involve the region of the medulla, cyanosis may not develop. A hemorrhage in the region of the medulla or edema and petechial hemorrhages involving this area may produce immediate symptoms, and resuscitation of the infant at birth may be difficult if not impossible. Injuries of this type must of necessity be accompanied by cyanosis with or without evidence of cortical irritation.

When the injury extends above the tentorium, the fontanelle may become full and tense, but when it is below the tentorium in the medulla the anterior fontanelle may not be abnormal. The findings by lumbar puncture are frequently of diagnostic value. A gross intracranial hemorrhage is revealed by a grossly bloody lumbar fluid containing large numbers of crenated red blood cells. A milder degree of subarachnoid hemorrhage is indicated by blood-tinged fluid containing crenated red blood cells. Cerebral edema is accompanied by a marked increase in the cerebrospinal pressure and a clear fluid free of red blood cells.

The prognosis is dependent on the location and degree of the injury. A diffuse hemorrhage in the subarachnoid or subdural spaces carries an excellent prognosis provided the injury is limited to these regions. A hemorrhage of less degree into the region of the medulla, however, is nearly always fatal. We have learned to be very guarded in our prognosis of mental development in cases with a history of marked intrauterine asphyxia, for while the prognosis as to life may be good, it is impossible to predict the amount of injury that the nerve tissue has suffered.

We have become more interested in the prophylaxis of intracranial injury than we have in its treatment and diagnosis, and are convinced that good obstetrics can almost eliminate the intracranial injuries resulting from trauma. During 1936 at the Boston Lying-in Hospital there was but 1 death from the traumatic type of intracranial hemorrhage in nearly 4000 births. The problem of reducing the intracranial injuries due to intrauterine asphyxia, however, is still unsolved. It is the largest single cause of infant death at the present time, and the outlook for its control is far from encouraging.

CIRCULATORY CAUSES OF CYANOSIS

HYMAN GREEN, M.D.*

BOSTON

CYANOSIS of the newborn caused by peripheral circulatory disturbance may be due to trauma, infection or congenital malformation. The last is least important and is seen only occasionally in an arteriovenous aneurysm. The traction and exposure of a difficult delivery and hemorrhage into the brain or elsewhere, with especial reference to the adrenal glands, are possible causes of the syndrome associated with shock, cold extremities, sweating and ashy pallor. The loss of

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tissue fluid results in dry, wrinkled skin, fever and alteration of the acid-base equilibrium. But all these — trauma, hemorrhage and dehydration — cause a diminution of blood volume, venous return and cardiac output, and with the increase of unoxygenated hemoglobin, cyanosis becomes apparent. Infection, on the other hand, causes cyanosis by cutting down pulmonary tissue exposed to aeration, as in pneumonia, or by disturbing the blood supply, as in the formation of a thrombus.

The diagnosis of true cyanosis due to congenital cardiac malformations requires accurate observation and thorough study of all clinical signs and symptoms.

Note first the presence of congenital deformities such as abnormal shape of head, slant eyes, harelip, cleft palate, peculiarities of ear lobes, remains of branchial clefts, dislocation of the lens of the eye, supernumerary fingers and toes (associated occasionally with dextrocardia), short neck as in the Klippel-Feil syndrome, configuration of the chest, absence of the manubrium, pilonidal sinus, imperforate anus, hypospadias, epispadias, clubfeet, dislocation of the hip and knee and unusually long fingers and toes as in arachnodactylia. These deformities occur frequently in conjunction with congenital heart defects.

Bear in mind that the chest may show prominence of the right or left side as a result of the cardiac enlargement. At this time the respiratory rate should be ascertained. Evidence of atelectasis from retained secretions or insufficient pulmonary expansion at birth may be disclosed by examination of the lungs. One must consider whether dullness is due to compression, as in cardiac hypertrophy.

The heart should be examined according to the following procedure:

First, palpate for a thrill. This may or may not be present, and unless marked it is not easily palpated in a newborn baby breathing rapidly. If present it is of distinct help. The thrill should be felt for at the suprasternal notch, the base, the pulmonic area, the body of the sternum and the apex.

Secondly, feel for the maximum impulse. The apex beat is sometimes quite strong. Percussion of the right and left borders is difficult in a newborn baby. Difficulty in finding an impulse should cause suspicion of dextrocardia. In that event, look for the liver on the left, and for evidence of a diaphragmatic hernia pushing the heart to the right.

Thirdly, before auscultation give the baby some orange juice, as crying will obscure a murmur. Note the rate, quality and rhythm of the heart sounds. Intensity and force of heart sounds vary. They may be strong, ticktock in quality or occasionally indistinct. Note the pulmonary second sound, as it may help to distinguish pulmonary atresia from stenosis. In atresia it is barely audible or is absent.

Fourthly, listen for murmurs. The murmur, a variable finding, is not present in all cases. It may appear one day and not the next, and unless fairly loud and constant is not an acceptable criterion for diagnosis. A soft murmur in the presence of cyanosis cannot be disregarded. The murmur may be soft, loud, rough or rumbling. The "machinery" murmur of patent ductus arteriosus evidently takes time to develop, as it is rarely heard in the newborn. The murmur is usually best heard over the body of the heart, over the sternum, at the base in the pulmonic area, occasionally in the aortic area and less frequently at the apex. The character and location do not give much clue as to the nature of the lesion at this age.

The liver and spleen may be enlarged. Neither has any special bearing on the diagnosis of congenital heart disease except in so far as it shows congestion. Edema does not occur unless there is cardiac failure. With cyanosis, the congested capillaries act as a reservoir for the stagnating blood. Ophthalmoscopic examination should come last, as it makes the baby cry. It may reveal congestion of vessels entering the nerve head or cyanosis of the retina.

Note the degree of cyanosis. It varies in the individual case depending on the amount of anoxemia produced by the defect, whether by a reduction in the amount of blood which reaches the lungs, by right-to-left shunt or by capillary stasis. The defects producing a permanent right-to-left shunt are, first, obstructive lesions, as stenosis or atresia of vessels leaving the heart; second, transposition of the great vessels; and third, large septal defects, in which the shunt is usually terminal. The bizarre combination of defects which may occur in the newborn makes it difficult to diagnose the anatomic lesion. Patent foramen ovale is never the cause of death in newborn babies. Cyanosis is usually best seen in buccal mucous membranes, tongue, fauces, lips, cheeks, fingers, toes, conjunctivas and eyelids. It may be intensified by crying.

Dyspnea becomes more evident with the appearance of cyanosis. The respiratory system compensates for the anoxemia by hyperventilation. Harelip, cleft palate and macroglossia interfere with swallowing and produce dyspnea. Passage of stool increases the respiratory rate. As a result of dyspnea, duration of breast feeding is short.

When put on the bottle, the baby takes it poorly for the same reason; as a result the formula is frequently changed and feeding difficulties arise. Coughing and choking may be due to pressure on the right bronchus from a right-sided aorta or a vascular ring causing pressure on the trachea. Bleeding may be due to congestion from increased venous pressure.

Slowing of the circulation favors the formation of thrombi. When they appear in the cerebral vessels they account for the convulsive seizures, and when they appear in the abdominal vessels they explain pain and local distention.

A complete blood examination should be done. This will rule out erythroblastosis fetalis. Red-cell and hemoglobin counts are most important, as they are particularly high in congenital heart disease. A red-cell count as high as 9,000,000 or 10,000,000 is frequently found in the extreme cyanosis of congenital cardiac disease.

X-ray examination has been found to be of the greatest importance in recent years. It has helped to confirm or deny suspicions of enlargement by percussion. Cardiac enlargement by x-ray in a newborn baby ostensibly means congenital heart disease. Even with x-ray examination, one cannot be absolutely certain of the diagnosis, as an enlarged thymus may be superimposed and thus alter the apparent shape and size of the cardiac shadow. If the thymus does cover the cardiac area, it is then possible to radiate the thymus, reduce its size and obtain an accurate picture of the heart. In older children, oblique views are valuable in differentiating the heart chambers and changes in the great vessels at the base. This is not so practicable in the newborn.

We have hoped to be able not only to diagnose congenital heart disease in the newborn with cyanosis but actually to determine the lesion. This has not been too satisfactory, as it takes time for a characteristic cardiac shadow to develop, usually at least six months.

The electrocardiograph has been of some value in congenital heart disease but not particularly in the newborn. We have seen congenital heart block and paroxysmal auricular tachycardia, but as a rule the electrocardiograms show wide QRS complexes or a right ventricular preponderance.

If a newborn baby has cyanosis, dyspnea, a high red-cell count, difficulty in feeding, multiple congenital deformities and cardiac enlargement by x-ray, with or without a murmur, it should be assumed to have a congenital heart malformation. If one of these criteria is lacking, the diagnosis is presumptive.

PULMONARY CAUSES OF CYANOSIS

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BOSTON

THE commonest cause of cyanosis in the neonatal period is obstruction of the air passages by foreign material such as blood, mucus, amniotic sac contents and meconium. The presence of such material may result in anoxemia of severe degree but is more commonly the cause of mild, transient attacks of cyanosis during the first one or two days of life. Aspiration of this material into the lungs not only interferes with alveolar function but may also introduce bacteria with resulting pneumonic infection. Interference to the pulmonary ventilation may also result from injury, congenital abnormalities or tumors.

Atelectasis is defined as "imperfect expansion of the lungs at birth." The expansion of the lungs, however, is a gradual process, and some degree of atelectasis is always present even under normal conditions during the first few days of life. It is estimated that at least two to four days are required for complete expansion of all portions of both lungs in the full-term infant who breathes normally and has no interference with respiration. In the premature infant a period up to six weeks or longer may be required to inflate the lungs fully.

This initial atelectasis present in all infants during the first few days of life may be considered physiologic atelectasis of the newborn. Because of various factors interfering with respiration, the atelectasis may persist to a pathological extent, and be of distinct importance in the production of cyanosis.

Another type, resorption atelectasis, is found in infants who have breathed so well for a varying period that the lungs have been well expanded. After some factor has interfered with respiration, the air may be slowly absorbed from many alveoli, with resultant resorption atelectasis. The chief importance of this type of atelectasis lies in the implication that expansion has once taken place and that subsequently some interference with respiration has occurred. These types cannot be differentiated clinically, of course, but can be recognized microscopically.

Atelectasis of these types may occur in premature as well as in full-term infants. The lungs of the former differ from those of the latter, however, in that there may be areas of incompletely

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developed, unexpansible pulmonary tissue. The extent of such areas is roughly proportional to the degree of immaturity.

Atelectasis is generally considered a most important factor in the production of cyanosis. It is true that it is an almost constant accompaniment of every variety of asphyxia in the newborn; and there must be a relation between the atelectasis and the anoxemia. However, if the lung is perfectly developed anatomically, the atelectasis should be considered secondary to more fundamental causes which must be determined in order to arrive at a correct diagnosis. Wilson and Farber* considered the causes of atelectasis as follows:

1. Cohesion of the moist surfaces of the air passages in collapsed and airless lungs. This "stickiness" of the collapsed airways offers considerable resistance to the entrance of air, and a relatively great force is required to overcome it and to separate the bronchiolar and alveolar walls during the initial expansion. The first breath of every new-born baby may thus be its most difficult one, and especially vigorous inspiratory efforts must be maintained for a variable period after birth until the normal atelectasis is finally overcome. This initial resistance of the atelectatic lungs to expansion is always present and contributes to the maintenance of atelectasis to a pathologic extent when it is combined with any of the following factors.

2. An imperfectly developed or an injured respiratory center which does not respond to the normal stimulus and fails to bring about repeated and sufficiently vigorous inspiratory efforts.

3. A poorly developed thorax, especially seen in premature infants when the bony framework of the thorax and the contraction of the intercostal muscles do not furnish an effective *vis a tergo* for the efficient action of the diaphragm.

4. Bronchial obstruction due to aspiration of the contents of the amniotic sac, mucus or blood.

The symptoms of atelectasis are cyanosis and difficulty in respiration. These symptoms may be confused with those due to associated conditions. The cyanosis may occur in attacks or may persist with varying intensity. The respirations are usually rapid and very shallow, but may be irregular and interrupted by periods of apnea. Often the respiratory efforts are vigorous, with retraction of the suprasternal space and retraction of the thoracic wall along the line of attachment of the diaphragm. The pulse is rapid but as the cyanosis becomes intense slows down markedly. Amazingly few abnormal signs are found on physical examination of the lungs. Occasionally fine, crackling rales may be heard posteriorly near the spine.

In an infant with cyanosis the diagnosis is very difficult, since it is practically impossible to tell to what extent the clinical findings are due to atelectasis and to what extent to some underlying pathologic lesion. X-ray examination of the lungs may show irregular shadows radiating from the hilus outward into the lung fields suggestive of atelectatic areas.

Pneumonia is a rare cause of cyanosis in the newborn but may occur. Congenital anomalies such as tracheoesophageal fistula and diaphragmatic hernia and, rarely, massive pulmonary hemorrhage associated with hemorrhagic disease of the newborn may be the underlying factors.

*Wilson, J. L., and Farber, S.: Pathogenesis of atelectasis of the newborn. Am. J. Dis. Child. 46:590-603, 1933.

PATHOLOGICAL ASPECTS OF CYANOSIS

SIDNEY FARBER, M.D.*

BOSTON

CYANOSIS of the newborn has been defined by my colleagues here from the clinical and chemical points of view as a symptom of a variety of disturbances of the central nervous system, the respiratory and vascular systems and the components of the blood stream. Since the presence of cyanosis does not in itself imply a fatal prognosis, it would appear that only its most serious causes lie within the experience of the pathologist. On occasion, however, when superimposed infection or an unrelated disease process brings about death in cyanotic babies, information concerning the milder degrees of cyanosis may be obtained. A careful correlation of clinical and chemical observations with the results of an expertly performed postmortem examination offers the only completely reliable means of ascertaining the cause of cyanosis. From a pathological point of view its underlying basis may be found in lesions which interfere with normal central control of respiration, in alterations within the respiratory system which prevent the necessary exchange of gases, in congenital structural abnormalities in the cardiovascular system which permit an admixture beyond the critical level (30 per cent) of venous and arterial blood, and in extrinsic factors which interfere with the passage of the air into the lungs. Of these the most frequent are disturbances of the central nervous system and the lungs.

Cerebral hemorrhage, edema and congestion following obstetric trauma or intrauterine asphyxia are the lesions most commonly found as the cerebral causes of cyanosis. Adequate information concerning the brain, the dural septums of the skull and the important cerebral veins can be obtained in autopsies on the newborn only if the method

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described by Beneke and Holland* or one of its modifications is employed. Cerebral hemorrhage may be found in the subdural or subarachnoid spaces, in the ventricles or within the substance of the brain. The subtentorial region is the location of greatest significance in respect to cyanosis; hemorrhage over and sometimes into the pons and medulla is the most serious cerebral cause of cyanosis. Hemorrhage over the convexity of the brain or into the ventricles and cerebral edema and congestion probably cause cyanosis by bringing about an increase in intracranial pressure, with consequent pressure on the brain stem. Tears of the falx and tentorium are of importance only if they cause injury to the great veins of Galen or their tributaries. Rupture of these veins, a sign of gross obstretric trauma, brings about massive hemorrhage, usually beneath the tentorium or within the ventricles. Rupture of smaller veins, particularly those in the pia arachnoid, may occur with milder degrees of operative manipulation, when intrauterine asphyxia intensifies the cerebral venous congestion which occurs regularly during compression of the fetal head in even a normal delivery. Diffuse slight hemorrhage in the subarachnoid space, and more rarely multiple petechial hemorrhages in the cerebrum and in the pons and medulla, are associated with intrauterine asphyxia. Such hemorrhages may become more numerous, and bleeding may continue after birth with increase of an already existing cyanosis of non-cerebral etiology. In such cases hemorrhage is often found in other organs and tissues.

In general, massive cerebral hemorrhage secondary to demonstrable gross tears of the large cerebral veins may be ascribed to obstetric trauma. Smaller areas of hemorrhage, usually multiple in nature, are most often associated with intrauterine asphyxia, to which a traumatic factor may be added. Examination of the lungs and other viscera aids in the determination of the cause of the hemorrhage in doubtful cases.

Aspiration of amniotic sac contents, pneumonia, massive pulmonary hemorrhage, gross obstruction to the upper respiratory tract by mucus or vernix caseosa and atelectasis are the commonest pulmonary causes of cyanosis. These conditions may be found singly or in various combinations. Gross examination of the lungs is inadequate, and microscopic examination with the aid of appropriate stains is essential for a correct diagnosis. Atelectasis has been discussed by Dr. Baty. It may be emphasized that the cause of atelectasis must be found in each case before an adequate understanding of the cause of the cyanosis is possible. Pneumonia in the newborn is rarely the result of a diaplacental infection. It occurs most often as a consequence of the aspiration of infected amniotic sac contents, or of gross exposure of the newborn to pathogenic organisms. Occasionally bacteria are transmitted to the lungs of a newborn baby during an improperly performed mouth-to-mouth resuscitation. There is no evidence that atelectasis predisposes to pneumonia, although pneumonic exudate in bronchioles may cause secondary or resorption atelectasis. Pulmonary hemorrhage, in order to be of significance in relation to the causation of cyanosis, must be either massive or in multiple foci. Such a hemorrhage may be a manifestation of intrauterine asphyxia, a part of hemorrhagic disease of the newborn or a complication of erythroblastosis fetalis. The most frequent pulmonary cause of cyanosis is aspiration of amniotic sac contents, which is demonstrable by the presence of large numbers of cornified epithelial cells in the available air spaces of the lungs, or of hyaline membranes composed of vernix caseosa. The finding of large amounts of amniotic sac contents in the lungs constitutes the most reliable evidence that intrauterine asphyxia has occurred. The vernix membranes offer serious interference to the exchange of oxygen and carbon dioxide in the lungs and, with the cornified cells, act as barriers to the entrance of air. Pulmonary edema, which may intensify an already existing cyanosis, is an almost invariable finding when a large hemorrhage is present over the cerebellum, pons and medulla. Pulmonary congestion, edema and hemorrhage may occur following the parenteral administration of blood and other fluids in amounts too large for the circulatory system of the newborn.

The circulatory system is responsible for cyanosis in the newborn when important congenital defects are present, when less important defects are complicated by pulmonary hemorrhage or pneumonia and when general circulatory collapse occurs as a consequence of intrauterine asphyxia or anoxia. Transposition of the great vessels, combinations of defects which include pulmonary stenosis or atresia and persistent truncus arteriosus may be mentioned as examples of the severest congenital cardiac anomalies. Cyanosis does not usually occur until more than 30 per cent of the venous blood has been shunted into the arterial circulation. Cyanosis is frequently absent in newborn infants suffering from severe cardiac anomalies, and may not appear until later in infancy or childhood.

Extrinsic obstruction to the entrance of air to the lungs may be caused by a vascular circle around

*Beneke and Holland: quoted by Farber, S.: *The Postmortem Examination*. 201 pp. Springfield: Charles C Thomas, 1937. P. 166.

the trachea, an anomaly explained by persistence of a right aortic arch, by pressure from a displaced pulmonary artery which may be tightly applied over the bifurcation of the trachea, or by congenital abnormalities in adjacent structures. The thymus has not in our experience been found a cause of cyanosis.

This discussion applies in the main to the premature as well as to the full-term infant. Certain exceptions may be made. Larger hemorrhages occur in the premature following small degrees of trauma than in the full-term infant. Except for immaturity of tissues, the most constant pathologic change noted in autopsies on premature babies is hemorrhage, which is usually slight and diffuse in many organs of the body. There appears to be sufficient evidence for us to speak of "immaturity of the respiratory center" in very small premature babies. This factor may in itself or in combination with pathologic changes in the brain or in the lungs account for cyanosis.

Etiologic considerations have been handled in more detail by my colleagues. A survey of our own experience shows that the most important and frequent causes of the lesions responsible for cyanosis in babies who die can be related to intrauterine asphyxia and to obstetric trauma. Dr. Teel will discuss the obstetric problems involved. It may be of interest to point out that some of the most pronounced examples of gross obstetric trauma and of intrauterine asphyxia have been found in babies delivered by cesarean section.

OBSTETRIC ASPECTS OF CYANOSIS

HAROLD M. TEEL, M.D.*

BOSTON

THE chief obstetric causes of disturbances in the newborn infant of which abnormal cyanosis is a symptom may be presented logically under the general headings intrauterine asphyxia, birth trauma and drugs.

Intrauterine asphyxia is the immediate cause of practically all stillbirths, including macerated fetuses. In lesser degree it is also a common cause of the livid and pallid types of asphyxia neonatorum. It may be brought about by any disturbance which results in failure of the umbilical vein to deliver adequately oxygenated blood from the placenta to the fetus.

The causal conditions are as follows: First, any condition which interferes with adequate oxygenation of the maternal blood. A common cause is anesthesia of the mother for a considerable interval before delivery; this will be considered later. Second, any condition which interferes with the normal circulation of maternal blood through a considerable proportion of the placenta. Premature separation of the placenta, infarcts of the placenta and tetanic contraction of the uterus, as occasionally seen after the use of pituitrin in labor are such causes. Third, any condition which impedes circulation through the umbilical cord. The commonest condition in this group is prolapse of the cord. Looping of the cord about the neck may result in constriction of the umbilical vessels due to relative shortening as the head descends into the pelvis. Rarely, the cord is too short or a true knot is found.

The most important diagnostic signs of distress of the fetus in utero are acceleration, slowing or gross irregularity of the fetal heart beat, in the order named. For this reason it is important to listen to the fetal heart at increasingly frequent intervals as labor progresses. In vertex presentations, the appearance of meconium in the amniotic fluid is a confirmatory sign.

Trauma incident to labor and operative delivery is another frequent cause of abnormal cyanosis of the newborn. The commonest lesions are intracranial hemorrhages due to stresses applied to the fetal head. Cerebral injury and hemorrhage in mature babies rarely occur during apparently normal labor. The soft head of the premature baby is much more susceptible to injury from the forces of normal labor. Prolonged pressure due to a rigid perineum often causes intracranial injury to the premature baby. Occasionally in mature babies, intracranial hemorrhage results from violent precipitate delivery, but most commonly it is a result of stresses applied to the fetal head which attend difficult operative procedures. The incidence of intracranial hemorrhage following mid-forceps, high-forceps, version, breech extraction and all pelvic deliveries through the incompletely dilated cervix is very high. The so-called "pelvic" application of forceps is a common cause. Forceps are designed for symmetrical application over the ears and malar bones. Oblique and asymmetrical application subjects the fetal head to tremendous stresses. In breech delivery, excessive traction on the body to deliver the head and twisting and excessive dorsiflexion at the neck may cause injuries to the cervical vertebrae and cervical cord.

The cerebral hemorrhages which attend operative trauma are usually gross, and result from tears of the falx and tentorium, with lacerations of the veins of Galen and the venous sinuses of the skull. They are distinguishable from the multiple smaller hemorrhages of the pia-arachnoid and brain substance, which are more commonly seen

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after prolonged and severe asphyxia preceding and following birth. The latter type of hemorrhage is particularly common in premature babies; this is probably related to the great delicacy of the small vessels. The relation between both intrauterine and neonatal asphyxia and these multiple small cerebral hemorrhages and edema in the premature baby is well established. Dr. Clifford has obtained evidence that asphyxia may also account for many cases of multiple petechial hemorrhages in the brain and elsewhere in mature babies, which have been loosely labeled hemorrhagic disease of the newborn.

The use of sedative, analgesic and anesthetic drugs during labor is a third obstetric cause of abnormal cyanosis in the newborn. It has been shown that the respiratory mechanism of the fetus in utero is highly susceptible to such drugs given to the mother. In animals, doses of anesthetics and sedatives which do not appreciably affect maternal respiration cause cessation of the normal rhythmic movements of the respiratory muscles of the fetus in utero. From the study of many thousands of deliveries following the use of combinations of such drugs as barbiturates, scopolamine, morphine, ether, nitrous oxide and oxygen, and paraldehyde, we may tentatively accept the following points as reasonably well established.

First, when administered in moderate doses in a well-equipped obstetric hospital by a physician familiar with their contraindications and limitations, the use of such drugs does not increase the stillbirths and the neonatal death rate among mature infants.

Secondly, opiates given within four hours before delivery are often followed by marked and sometimes alarming asphyxia neonatorum in mature babies.

Thirdly, prolonged maternal anesthesia prior to delivery with much less than 20 per cent oxygen in the inhaled mixture results in varying degrees of and sometimes marked asphyxia neonatorum in mature babies.

Fourthly, a considerable percentage of premature babies whose mothers have been given sedative, analgesic and anesthetic drugs during labor have extreme difficulty in establishing and maintaining adequate respiration. The neonatal mortality among premature babies whose mothers have been given morphine is considerably higher than among those whose deliveries have been conducted without opiates. The least asphyxia neonatorum and cyanosis and the lowest premature neonatal mortality are encountered in those premature babies whose mothers have been delivered without the use of analgesics and general anesthetics.

General Discussion

Chairman McKhann: I will ask Dr. Clifford to tell us how he determines the cause of cyanosis in the newborn, and how he treats cyanosis, especially that due to cerebral causes.

Dr. Clifford: When confronted with a patient presenting the symptom of cyanosis, one should get as careful a history as possible, because very frequently the diagnosis will be obvious once the history is elicited. For instance, one might find that the fetal heart had become inaudible and that at birth the baby required ten or fifteen minutes of mouth-to-mouth resuscitation plus stimulation by adrenalin, arriving in the nursery gasping for breath and very cyanotic. Under these conditions the history would be very helpful in ascertaining the cause of the condition. In this case the cyanosis would be the result of primary intrauterine asphyxia, and we could almost predict from that history what the findings on physical examination or at autopsy would be. If on the other hand we found that there had been a very long labor and dystocia, with the position of the fetus so abnormal that a very difficult forceps delivery was necessary, we should suspect intracranial trauma as the primary cause of the cyanosis. Again, an entirely normal history would help to eliminate trauma and asphyxia as causes.

Having obtained a careful history, the importance of which cannot be overemphasized, one should proceed with the physical examination of the baby. If there is marked molding or suspected fracture of the skull, if there is abnormal tension of the fontanelle or if there are convulsions, a lumbar puncture is indicated. If a grossly bloody fluid containing crenated red blood cells is obtained under increased pressure, we are safe in assuming that the primary cause of the cyanotic condition is intracranial injury. If on the other hand the fontanelle is tense, and the lumbar puncture produces clear fluid under increased pressure, the primary cause is probably cerebral edema. This situation accompanies a history of intrauterine asphyxia more often than it does one of birth trauma.

By a careful physical examination we try to rule out congenital malformation of the heart as the cause of the cyanosis. We must not be misled by the absence of a murmur. An x-ray photograph is of great assistance, but one must not confuse an abnormally large mediastinal shadow due to a thymus or massive atelectasis with cardiac hypertrophy. The diagnosis of congenital heart disease must be made more or less by elimination, unless very positive evidence is present.

With regard to cyanosis due to atelectasis, a history is again of great help. Atelectasis may accompany asphyxia or trauma or may be primary. The history is valuable through giving the story of intrauterine asphyxia, trauma or both. Inspection of the chest wall may show one side more expanded than the other. Rales may or may not be present, but to me the most valuable physical finding in the diagnosis of atelectasis is dullness to percussion; auscultation may give normal findings, bronchial breathing, exaggerated breath sounds or diminished breath sounds, depending on the scattering of the atelectasis. The percussion note detects more accurately than anything else the relative amount of unexpanded lung tissue. The x-ray film may be of assistance, but its interpretation is difficult. Congenital heart disease, intracranial injury and intrauterine asphyxia with atelectasis should be ruled out as causes of cyanosis before the diagnosis of primary atelectasis is considered.

The three conditions mentioned must always be considered in the differential diagnosis. A fourth condition is that of adrenal hemorrhage. In other words, in every case

of cyanosis of the newborn we must complete a differential diagnosis as to whether the cause is intracranial hemorrhage, congenital heart disease or primary pulmonary lesions such as atelectasis, or whether there are massive adrenal hemorrhages which are producing the symptoms. An adrenal hemorrhage is diagnosed by actual palpation of the tumor mass in the flank and the appearance, in the course of several hours, of an increasing amount of anemia.

CHAIRMAN MCKHANN: I have two questions submitted for Dr. Baty. First with regard to the respiratory passages in the newborn: Is the mucus normally removed by absorption or coughed out from the mouth, and how does this affect the position in which newborn babies should be kept? Second: What forms of therapy are desirable in the treatment of atelectasis, and what is Dr. Baty's opinion of the infant-model Drinker respirator?

DR. BATY: The accumulated mucus in the respiratory passages is largely eliminated by coughing. Some of the mucus that gets down into the lungs is undoubtedly absorbed provided it is composed of absorbable material. The question of the position of the infant I should like to refer to someone else.

The main problem in the accumulation of mucus in the respiratory passages is that of clearing the upper respiratory passages immediately after birth, and as often as seems necessary during the first day or so of life. This is done in the larger lying-in hospitals by ordinary suction apparatus. In homes, suction can be done with a tube from a stethoscope hooked up with a small bottle.

There has been a great deal of discussion about the use of oxygen and the combination of oxygen and carbon dioxide in the treatment of cyanosis in the newborn. This was stimulated very largely, I think, by Henderson's[1] work. As you know, he recommends the use of a mixture of oxygen and carbon dioxide. Eastman[2] has shown clearly that at least in the immediate postnatal period the infant who has asphyxia probably does not need carbon-dioxide inhalation, and indeed that it may be harmful in further increasing acidosis. Eastman, I think, agrees that after the first few hours of life the carbon-dioxide and oxygen combination is probably more efficacious in stimulating respiration than is pure oxygen.

Oxygen or carbon-dioxide and oxygen mixtures are accordingly used as indicated by the presence or absence of cyanosis. In an infant who has atelectasis, it is probably a valuable therapeutic procedure to stimulate breathing with regular periods of carbon-dioxide and oxygen inhalation. My routine procedure is to give such inhalations fifteen minutes out of every hour during the first twenty-four or forty-eight hours.

I cannot say much about the Drinker respirator. In cases where there are no evidences of intracranial hemorrhage and where the upper air passages are free, there seems to be no question that the infant type of respirator is efficient in expanding the lungs. However, it may be quite dangerous, and from the recommendations of various doctors I gain the impression that while the respirator may be of value in large institutions it should not be used generally. I should be very glad to hear the opinion of others.

CHAIRMAN MCKHANN: If the Drinker respirator is dangerous, Dr. Farber must be aware of it. I will ask for an opinion from the pathologist. Another question for Dr. Farber to answer concerns the extent to which the recent work on intrauterine respiration of the fetus accounts for the presence of amniotic sac contents in the lungs. How much of this aspirated fluid is normally expected and how much is necessary to produce physiologic cyanosis?

DR. FARBER: My experience with the Drinker respirator is based on experimental work on animals, studies of the lungs of infants removed after death and placed in a modified Drinker respirator, and pathological control of many of the clinical observations made by my co-worker of many years, Dr. James Wilson.

The Drinker respirator has only one purpose: to get air into and out of the lungs. It will not make a patient breathe. It cannot be successful in the presence of massive obstruction to the upper respiratory tract. It will not cure cerebral hemorrhage and it will not cure pneumonia. If we expect it to do only what it was designed to do, it is a perfectly good machine. I have seen no real damage done to the lungs by an infant respirator when correctly used at the pressures recommended by Dr. Wilson and other workers.

It is perfectly possible to blow out the lungs by the use of any artificial device, including the Drinker respirator. I have seen pneumothorax and rupture of the lung following mouth-to-mouth resuscitation, when the accoucheur forgot that he weighed 200 pounds and the baby only 5 pounds. I have seen no evidence that hemorrhage, congestion or edema of the lungs could be caused by the infant respirator when the correct pressures were used.

I regret in many ways that this apparatus has not been used so much as it deserves. It has fallen into disrepute largely because people expected it to cure many conditions which it was obviously not designed to treat.

In reply to Dr. McKhann's second question, the recent work to which reference was made is that of Rosenfeld and Snyder[3] in Baltimore. They have made an excellent study of the status of the respiratory system in utero, and have been able to show particularly that anesthetics given to the mother or the experimental animal cause a cessation of respiratory movements of the fetus in utero. It has been known since the fifteenth century or so that animals make respiratory movements in utero. It was shown by Ahlfeld[4] in Germany in 1880 that there were rhythmic movements of respiratory muscles in the human fetus.

From experimental work, and from postmortem observations which Dr. Wilson and I have been able to make during the last several years, we are unable to agree that real respiration occurs in utero, with a tidal flow of amniotic fluid entering the lungs and returning to the amniotic sac. If that were true we should expect to find in the lungs of every newborn baby large amounts of vernix caseosa and large numbers of cornified cells, but this is not the case. The amount of aspirated amniotic fluid which we find in the lungs of babies who show no pulmonary symptoms is the amount which we should expect to be aspirated from the mouth and throat with the first breath or two. There is normally, of course, amniotic fluid in the mouth and throat in utero.

Concerning our own experimental work, I should like to state merely that there is no doubt that there are movements of respiratory muscles in utero. We have found no justification for the assumption that there is real intrauterine respiration, that is, actual passage of amniotic fluid into and out of the lungs of the fetus.

The amount of aspirated sac contents which we regard as pathologic is purely arbitrary. When various fields are filled with cornified cells, when the available air spaces are taken up by vernix or cornified cells, and when we can show that the bronchioles and alveolar ducts are obstructed, we regard that amount as pathologic.

CHAIRMAN McKHANN: Dr. Clifford, there are two or three questions for you. If a newborn baby has a cerebral cause of cyanosis, should blood transfusion play a part in therapy? Second: How would you answer the question concerning the position of the newborn baby? Third: If, as Dr. Farber says, the use of the Drinker respirator has been neglected, does your work in the Lying-in Hospital enable you to explain why?

DR. CLIFFORD: In the treatment of a baby presenting the symptoms of intracranial injury, it is our practice to give a small amount of blood intravenously; I mean from 30 to 40 cc. This is done on the assumption that if the baby has a bleeding tendency and if the injection of blood will arrest it, we may stop the intracranial bleeding instead of allowing it to reach serious proportions. The argument against transfusion is that in the presence of injured vessels it may increase the blood pressure and actually increase bleeding. This is probably true of large transfusions, but it is certainly not demonstrable in practice when one confines himself to the small amounts mentioned.

Further treatment is the same as that for adults, namely treatment of shock, maintenance of normal temperature, absolute rest and combating of cerebral edema. The last is done by means of intramuscular injections of 50 per cent magnesium sulfate, 0.5 cc. every three to four hours, on the assumption that it will act as a dehydrating agent for cerebral tissue.

I do not know the proper position in which one should place a newborn baby that is cyanotic and has much mucus in the trachea. If we think there is cerebral bleeding and make the head the lowest part of the body, we may increase the stasis and intracranial oozing or edema. On the other hand, if there is much fluid in the lungs and we place the baby upright, we may interfere with respiration. As a result, most of the time we compromise and leave the baby flat. With suction apparatus we find that by listening to the sound of the baby's respiration we can tell when it is beginning to accumulate mucus. The suction is of great assistance in freeing the upper respiratory tract of mucus.

As to the Drinker respirator, I am sorry the subject came up because it was in the Boston Lying-in Hospital that the first work on this apparatus was done, and there we had the first infant model. We had seen the dramatic results from the Drinker respirator secured in older patients suffering from intercostal or diaphragmatic paralysis. We had great hope that through this device we might expand atelectatic lungs or support cyanotic babies until recovery.

It is my opinion that the infants whose resuscitation is credited to the Drinker respirator would have recovered anyway, and that the markedly atelectatic infants on whom the respirator was used were in no way benefited. They could not be made to breathe with it, their lungs were not expanded, and the severe cases had the same unfavorable outcome as did those in which the apparatus was not employed.

For a long period the respirator was used extensively, but when it became apparent that it was ineffective it was discarded. We have not had one in the hospital for several years.

In infantile paralysis, with intercostal paralysis, the Drinker respirator is of high value, but when there is a cerebral cause for the non-expansion of the lungs, it has proved worthless. Furthermore, in massive atelectasis of the newborn not of cerebral origin the respirator has in my experience been useless.

CHAIRMAN McKHANN: Dr. Teel has heard from the pediatricians and from the pathologist. We should like to learn from him what can be done to give us fewer cyanotic babies.

DR. TEEL: It appears that the cases of abnormal cyanosis at and following birth which we can remedy are due to causes associated with pregnancy and labor. The first group is that of premature babies. We have learned that they are more susceptible than full-time infants to intracranial injury, that they have a hard time establishing and maintaining respiration, and that they get multiple petechial hemorrhages from asphyxia perhaps more readily than do full-term babies. We can prevent a certain amount of premature labor by providing adequate prenatal rest, for women who do too much in the last months of pregnancy are apt to start in labor prematurely; by adequate treatment of toxemia; and by the treatment of maternal syphilis. Finally, premature rupture of the membranes, an important cause of premature labor, can be partially prevented by abstention from vaginal douching and intercourse during the last months of pregnancy.

But suppose that the mother goes into premature labor despite every precaution. We have learned that premature babies do badly when their mothers are given large doses of anesthetic and analgesic drugs during labor, and that opiates increase their neonatal mortality. It is probably wise to limit anesthesia to a brief period during delivery and to give more than 20 per cent oxygen in the anesthetic mixture. It has been found that the trauma of the rigid perineum, even though there be no cephalopelvic disproportion, may produce cerebral injury, particularly in premature babies. One can cut the perineum and avoid that injury. One can also terminate prolonged second-stage labor in the case of premature babies by forceps, but only after the head is clearly on the perineum and the cervix is out of the way.

The body temperature of the premature baby has a tendency to fall rapidly after birth, so that even though one be an obstetrician and not a pediatrician, it behooves him to see that the baby is kept warm. The body temperature may drop to 93 or 94°F. in forty-five minutes or an hour. The use of blankets and hot-water bottles — outside the blankets — is a helpful procedure. Hospitalization is desirable.

In the conduct of delivery of mature babies, one can detect intrauterine asphyxia if one counts the fetal heart beat frequently. In the latter part of labor, and always during the second stage, the beat should be counted at least every fifteen minutes. Provided conditions are safe for a simple outlet forceps delivery, that is to say if the head is on the perineum, we can save an occasional baby by following the fetal heart. In such cases, at first the heart is rapid and may exceed 170. Subsequently the rate tends to drop, often going below 110 or 100. Finally, it may become grossly irregular and slow — an alarming sign.

High-forceps and mid-forceps delivery, version, and delivery through the incompletely dilated cervix are all dangerous and usually unnecessary procedures, so that we should limit them to cases in which they are absolutely necessary — a very small percentage.

There have been several comments about resuscitation of the newborn baby. I shall list the various procedures in the order in which we employ them.

As soon as the baby is born we use postural drainage. If one holds the baby up by the feet and gently extends the head, much of the fluid contents of the mouth, pharynx and trachea will run out. Next, we remove mucus, blood, vernix caseosa and meconium from the mouth, nose and pharynx by gently aspirating with ordinary rubber-bulb

suction. If the baby has been markedly asphyxiated in utero and there seems to be obstructive material in the trachea, we aspirate the tracheal contents with a small rubber catheter. Thus, first we attempt to provide and maintain a clear airway. Artificial respiration is useless until air can go in and out.

Secondly, we do not add to existing shock by cold-water ducking, vigorous shaking and spanking. Adults in shock are not treated by being beaten and put in cold water, and there is no point in treating babies so.

Thirdly, we attempt to maintain body temperature, which is particularly important in shock; the use of the warm tub is effective.

Fourthly, we perform artificial respiration. In babies with livid asphyxia who are not in severe shock, this is most simply done by placing the hand on the chest and gently compressing it and allowing it to expand. If this fails, mouth-to-mouth insufflation is tried, great care being taken to see that the lungs are not ruptured. The effectiveness of this procedure may be determined by placing the hand on the chest. We next resort to mechanical devices, and last of all — and quite as important as any procedure — we supply oxygen.

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IRON ASCORBATE IN THE TREATMENT OF ANEMIA*

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SINCE Starkenstein[1] advanced his views concerning iron medication there has been a rapidly increasing tendency to employ the more effective ferrous ion as a basis of all iron medication. As a consequence, there has been a growing demand for iron preparations consisting chiefly of the ferrous ion, and such drugs as ferrous sulfate and reduced iron are now widely used in clinics. However, there still remain the vexing problems of intravenous iron medication, and the use of iron in the so-called iron-sensitive patients who develop nausea, diarrhea and intestinal cramps whenever any of the usual iron preparations are used. Heilmeyer,[2] of Jena, thought that the union of the ferrous ion with a molecule which is normally present under physiologic conditions of the body might make a more stable preparation and at the same time lower the toxicity. The molecule of ascorbic acid appeared to be the ideal substance, as it contained two readily replaceable groups, was a powerful reducing agent and was a normal constituent of living tissue.

Szent-Györgyi[3] in 1934 described a compound of iron and ascorbic acid. Animal experimentation indicated that when given intravenously as an iron preparation this compound was less toxic than ferrous sulfate, iron ammonium citrate or ferrous chloride. Szent-Györgyi stated that it was an effective therapeutic agent for anemia, but considered that all vitamin activity was destroyed in its preparation.

This iron-ascorbic acid compound has been studied also in France, where Arloing et al.[4] have investigated its action on malignant tumors. These workers have also prepared the lead and magnesium salts of ascorbic acid and claim favorable results in treating patients with cancer.

Heilmeyer[2] asked the chemist Maurer to prepare some of the compound for clinical use: Maurer and Schiedt[5] carried out complete studies of the chemistry of the substance and ascertained the following facts. The compound can be easily prepared by the action of reduced iron on l-ascorbic acid, the iron displacing the hydrogen, which comes off as a gas. If the reaction is carried out under toluol, the end product is a colorless solution and the resulting compound contains 15 per cent iron. When the colorless solution is filtered into 10 volumes of acetone, a deep-purplish precipitate is formed. Filtration, washing with alcohol and ether and drying in a vacuum yield a deep-purplish powder with an iron content of 22 per cent. This powder is readily soluble in water, has a pH of 6.9 to 7.0 and has a salty, somewhat sweetish taste. Exposure to air results in a change from purple to brown and a gradual separation of iron.

Contrary to the findings of Szent-Györgyi,[3] more recent studies by Pijoan[6] on a patient with scurvy and on scorbutic guinea pigs have shown this substance to have definite antiscorbutic activity. We are in complete accord with Pijoan's results so far as man is concerned. In our own studies we observed in 4 cases an elevation of the blood content of vitamin C from 0.2 mg. per cent or less to 1.3 mg. per cent or more, following the

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ingestion of iron ascorbate in 900-mg. doses for five days. Pijoan made the interesting observation that after the ingestion of iron ascorbate vitamin C appeared to be liberated at a uniform rate with the result that there was a more prolonged blood elevation of this vitamin than is usually observed.

Save for the brief mention by Szent-Györgyi of the favorable action of iron ascorbate in anemia, no clinical study of this substance was made until Heilmeyer[2] investigated its action in 14 cases of anemia representing chronic blood loss, nutritional anemia and so-called idiopathic hypochromic anemia. His results were gratifying. He found the intravenous medication as effective as the oral. He gave 10 mg. of iron as iron ascorbate intravenously or 300-600 mg. of iron as iron ascorbate by mouth daily, and observed a daily increase of 0.7 to 1.7 per cent hemoglobin. This figure compares favorably with the observation of Heath, Strauss and Castle[3] of a gain of 1.0 to 1.3 per cent each day on therapy consisting of 1000 mg. of reduced iron or 6000 mg. of iron and ammonium citrate. Heilmeyer considered 10 mg. of iron as iron ascorbate given intravenously to be as effective as 32 mg. of iron as iron and ammonium citrate given intravenously. Orally, 600 mg. of iron as iron ascorbate was as effective as 1000 mg. of reduced iron or 4 to 6 gm. of iron in the form of iron and ammonium citrate. He observed some slight flushing and palpitation in a few patients after intravenous medication.

In view of Heilmeyer's favorable report we decided to carry out a study of this substance in the medical clinic of the Peter Bent Brigham Hospital. We were particularly interested in seeing whether small intravenous doses were effective, and also whether this preparation could replace the standard compounds in patients who could not tolerate other iron preparations. Since none of the iron ascorbate was available on the American market, we were forced to prepare our own. We were able to obtain a considerable quantity of ascorbic acid,* and following the synthesis outlined by Maurer and Schiedt,[5] a large amount of the salt was prepared.

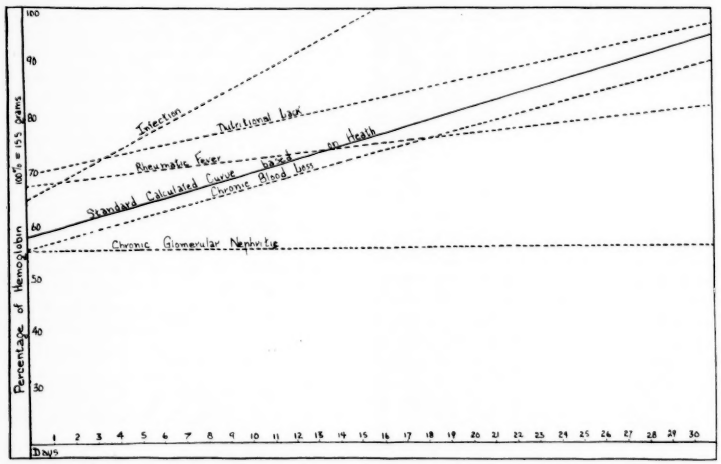

Chart 1. *Comparison of Average Increase in Hemoglobin with a Standard Curve. From the chart it is evident that iron ascorbate, when used in the so-called iron-responsive anemias, gives a hemoglobin increase that closely follows the standard curve set up by Heath.*[3]

During the course of our investigation 21 patients were studied. The dose employed on the basis of iron was 10 mg. intravenously and 200 mg. by mouth. In 3 patients exhibiting anemia due to blood loss and given the preparation intravenously there was a daily rise of 1.2 per cent hemoglobin, compared to Heilmeyer's value of 1.3 per cent. In 15 patients with anemia resulting from chronic blood loss, nutritional lack or

*Supplied through the courtesy of Hoffmann-La Roche, Incorporated, Nutley, New Jersey. Toward the end of the study Hoffmann-La Roche, Incorporated, was able to supply us with some of the salt, sealed in ampules, which proved to be satisfactory.

idiopathic hypochromic anemia, the average daily gain was 1.1 per cent hemoglobin (Chart 1).

In 3 of the patients whose hemoglobin values were below 50 per cent there was a gain of 1.5 per cent hemoglobin daily. The red-cell count always began to rise before the hemoglobin content did, while the reticulocytes usually began to increase on the third or fourth day and averaged around 4 per cent, in some cases going as high as 8 per cent. The hemoglobin estimations were done on the photocolorimeter, which had been standardized against samples of blood measured by the Van Slyke technic.

In view of the double action of this compound we thought it worth while to study its effect on patients known to respond poorly or not at all to iron medication. Intravenous injections of 10 mg. of iron as iron ascorbate were given daily for long periods to 2 patients with rheumatic fever and anemia, without any amelioration of either condition. Likewise, injections were given to 2 patients with chronic glomerular nephritis with anemia, without any favorable response. One patient with advanced lymphomatous involvement showed an increase in hemoglobin from 10 to 25 per cent and an increase of reticulocytes to 8 per cent when a daily dose of iron-ascorbate equivalent to 20 mg. of iron or more was given intravenously. The temperature fell to normal, the appetite increased and the patient felt stronger, but the entire course was slowly downhill, and death occurred one month after treatment had been begun. Analysis of the liver revealed 726 mg. of iron per kilogram, an enormous storage when compared with the normal amount, 100 to 270 mg.

In 2 patients who had become sensitive to iron and had nausea, diarrhea and cramps whenever any of the standard iron preparations were administered, iron ascorbate was given in doses equivalent to 200 mg. of iron by mouth without any discomfort; the hemoglobin content showed the usual increase.

CONCLUSIONS

We believe that iron ascorbate has no unusual properties, but that it is an effective form of iron medication. It can be given intravenously without reactions other than occasional slight flushing and palpitation, and it brings about a substantial gain in hemoglobin. It retains some vitamin C activity, thus making it doubly valuable in cases of anemia associated with subnormal levels of vitamin C, such as scurvy, duodenal ulcer and nutritional anemia. Intravenously, it appears to be as effective in doses of 10 mg. of iron as is 32 mg. of iron as iron and ammonium citrate. Orally, 200 to 300 mg. of iron as iron ascorbate is as effective as is 1000 mg. of reduced iron or 4 to 6 gm. of iron as iron and ammonium citrate. We feel that our work has completely confirmed the observations of Heilmeyer. The disadvantageous features of the preparation at present are its instability and the expense of preparation due to the high cost of ascorbic acid.

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PREMATURE SEPARATION OF THE NORMALLY IMPLANTED PLACENTA*

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PREMATURE separation of the normally implanted placenta is the commonest of all obstetric emergencies. From January 1, 1916, to January 1, 1938, there were 1241 cases of antepartum hemorrhage among 36,465 deliveries at the Boston Lying-in Hospital, a ratio of 1:30. There were 407 cases of premature separation of the normally implanted placenta, a ratio of 1:90. There were 364 cases of placenta previa, a ratio of 1:100; and the remaining 470 cases were those with mild degrees of antepartum hemorrhage in which the cause of the bleeding was ill-defined or undiagnosed. Many of these patients undoubtedly had mild cases of premature separation of the normally implanted placenta.

In 15 per cent of the 407 cases in this series the patients were between the sixteenth and the twenty-eighth week of gestation. Inclusion of this group seems justified because they were in all respects typical cases of premature separation, and demanded the same care and judgment in diagnosis and treatment as did patients admitted during the period of viability.

ETIOLOGY

Age and parity were of little or no significance from the standpoint of causation of premature separation.

Toxemia, syphilis, fibroids, abnormalities of the decidua and the like have been classified as predisposing causes of premature separation, while external and internal violence are judged to constitute precipitating factors (Table 1).

Table 1. *Etiologic Factors.*

PREDISPOSING FACTORS	NO. OF CASES	PRECIPITATING FACTORS	NO. OF CASES
Toxemia	176	Labor	273
Syphilis	3	Premature rupture of membranes	7
Fibroids	2	Fall	4
Previous cesarean section	5	Direct blow on abdomen	1
Bicornuate uterus	1	Automobile ride	1
Infantile uterus	1	Voorhees bag	3
Hydramnios	3	Pituitrin	3
Twins	9	Pomeroy maneuver	1
		Cough	2
		Colonic irrigation	1
		Vomiting	1
		Rectal examination	3
		Enema	1

Labor is a precipitating factor in many cases and is the usual cause of bleeding if the placenta is low-attached. Sixty-seven per cent of the patients in this series were in labor at the time of admission.

A specific toxic element has been hypothesized by many obstetricians as an etiologic factor by an assumed direct action on the smallest blood vessels, resulting in hemorrhages in the decidua basalis, and in some cases in other regions of the body. This theory of toxic separation originated as an explanation of the Couvelaire type of uterus. The high incidence of maternal toxemia (Table 2) favors the hypothesis.

Table 2. *Incidence of Toxemia.*

DIAGNOSIS	NO. OF CASES
Hypertension and albuminuria	103
Albuminuria without hypertension	51
Hypertension without albuminuria	22
No toxemia	231
Total	407

The fact that there are a multitude of elements which may operate in certain cases to bring about premature separation is prima facie evidence that the condition will never be explained on the basis of a single specific etiologic agent.

PATHOLOGY

The majority of separations begin at the margin of the placenta as a result of rupture of one or more marginal sinusoids. Hemorrhage takes place in the decidua basalis at the margin. The separation may remain localized or may extend over varying portions of the placental attachment. A blood clot forms on the maternal surface of the placenta. If hemorrhage is massive the villi beneath undergo an acute ischemic infarction and are closely packed. The affected cotyledons become flattened. Fibrin at the edge of the area of separation contains hemosiderin, which distinguishes the clot of premature separation.

All cases of premature separation of the normally implanted placenta are characterized in their genesis by hemorrhage which is entirely internal. Early in the course of the process a retroplacental hematoma can occasionally be palpated as a tender, circumscribed tumor. The great majority of cases will develop varying degrees of external hemorrhage if sufficient time elapses be-

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fore treatment is instituted (Table 3). The escape of blood may be impeded by firmly adherent membranes, by a tight internal os or by tamponade of the birth canal by the presenting part.

Uteroplacental apoplexy is the result of infiltration of the uterine musculature with blood and edema. The uterus in extreme cases assumes a purplish-blue color due to subserous collections of blood over its surface. Subserosal hemorrhages are usually most marked on the uterine wall opposite the point of placental attachment. Occasionally extravasations are encountered in the region of the broad ligaments and adjacent structures.

Histologically the Couvelaire uterus shows hemorrhage along the course of the blood vessels, marked edema of the uterine wall and dissociation of the muscle fibers by the extravasated blood. A uterus so infiltrated with blood loses its normal resiliency and demonstrates contractility varying from tenseness to board-like rigidity. However, if the duration is long and the hemorrhage excessive the uterine musculature eventually loses its powers of contractility and retractility, with the result that the organ becomes dilated, atonic and flabby. The venous sinuses then open and more blood escapes.

Table 3. *Type of Hemorrhage.*

NATURE OF BLEEDING	NO. OF CASES
Internal hemorrhage	20
Combined internal and external hemorrhage	138
External hemorrhage	249
Total	407

SYMPTOMATOLOGY

Many patients develop mild degrees of separation that are self-limited and remain undiagnosed. At some stage of the pregnancy there is a slight amount of external hemorrhage which subsides with rest or, if the bleeding remains concealed, there is an area of localized tenderness at the site of placental separation. The onset of symptoms may be insidious, or sudden, violent and exceedingly dramatic. Many patients with internal hemorrhage delay in obtaining medical assistance until bleeding appears externally. By this time the loss of blood is often excessive and the patient's life in great jeopardy.

In attempts at evaluation of the patient's general condition, shock is almost invariably out of proportion to the apparent loss of blood if the hemorrhage is at least partially concealed. The pulse rate is of more importance than the general appearance in determining the extent of the process. The blood pressure is often low as a result of hemorrhage and shock. Blood counts and hemoglobin estimations may be of little significance if the onset is sudden and the duration short.

Any patient, whether or not in labor, who has more than the usual amount of bloody "show" should be suspected of having premature separation. The blood is often dark and clotted, in contradistinction to the bright-red and fresh blood of placenta previa. The latter condition is also painless, while pain is a variable symptom in premature separation. Many patients have no pain presumably because the blood has found a ready exit; these cases can be distinguished from placenta previa only by careful pelvic examination.

A high proportion of patients with premature separation have an associated toxemia, the finding of which may assist in the diagnosis. A specimen of urine should be obtained by catheter in every case of antepartum hemorrhage. Albuminuria or casts or both are indications of premature separation. A low blood pressure does not exclude toxemia.

Internal hemorrhage results in enlargement of the uterus and varying degrees of irritation and spasm of its musculature. If the patient is in labor the uterus may maintain a state of tenseness or rigidity between contractions. A spastic uterus is always suggestive of premature separation, while an extreme degree of tonicity — board-like rigidity — is almost pathognomonic.

TREATMENT

The proponents of various methods of treatment of premature separation are all attempting to accomplish the same end: the control of hemorrhage and delivery of the patient. Before 1920 accouchement forcé was commonly chosen as the method for bringing about immediate delivery. Since 1920 cesarean section has been advocated by most American obstetricians as the procedure of choice. It was used in the Boston Lying-in Hospital for cases with internal hemorrhage until 1931 (Table 4). Following Polak's[1] introduction of the pack-and-Spanish-windlass method for treatment of premature separation, no patient in this hospital has been subjected to cesarean section unless the baby was alive and viable and the mother in good condition.

Patients already in labor are delivered from below unless there is some contraindication. A few such patients were subjected to cesarean section for the sake of the baby. Those who were allowed to proceed in labor frequently had the membranes artificially ruptured, a procedure which very often seemed to control the hemor-

rhage. Occasionally labor was hastened by small injections of posterior pituitary extract or by the use of a Voorhees bag.

Many women with internal hemorrhage have lost their lives because they were subjected to procedures which added to the shock and hemorrhage from which they were already suffering. Once the diagnosis is established the basis of treatment should be the control of further hemorrhage, the restoration of lost body fluids and the relief of shock. If markedly exsanguinated the patient may need multiple transfusions to restore blood volume. Delivery should be brought about by the procedure which is least productive of shock under the existing circumstances. With this in mind the pack-and-Spanish-windlass method has been utilized at the Boston Lying-in Hospital since 1931, with good results.

Table 4. *Treatment of Premature Separation, Boston Lying-in Hospital, January 1, 1916, to January 1, 1938.*

Treatment	Type of Hemorrhage			All Cases
	Internal	Combined	External	
Bagging	3	5	27	35
Braxton Hicks version	1	1	10	12
Accouchement forcé	0	12	26	38
Normal labor	3	22	146	171
Cesarean section	4	70	30	104
Pack and Spanish windlass	3	18	11	32
Porro operation	0	8	2	10
Vaginal hysterotomy	0	0	4	4
Undelivered	0	1	0	1
Totals	14	137	256	407

Cesarean section is still advocated by many obstetricians in the treatment of internal hemorrhage, in order that an appraisal of the condition of the uterine musculature may be made by direct inspection. Porro hysterectomy is performed by some operators if the uterus is infiltrated with blood. Others reserve hysterectomy for cases where bleeding continues in spite of massage and the action of oxytocic drugs. Irving[2] has pointed out the dangers of increased shock and hemorrhage attending cesarean sections and Porro operations. Experience with cesarean section at the Boston Lying-in Hospital bears out the belief that most uteri of the Couvelaire type contract satisfactorily and control the hemorrhage. Hysterectomy for the control of postpartum hemorrhage was necessary in only 3 cases out of 107 in which cesarean section was done, although in 73 of these the uteroplacental apoplexy of Couvelaire was demonstrated.

Table 5. *Role of Toxemia in Maternal Mortality.*

Type of Death		No. of Cases
Non-toxemic		7
Toxemic		11
With convulsions	4	
Without convulsions	7	
Total		18

Maternal Mortality

In this series of 407 cases there were 18 deaths, a gross maternal mortality of 4.4 per cent. Toxemia played a prominent role (Table 5).

Bearing in mind that cesarean section was employed in a high proportion of the serious cases of internal hemorrhage, an attempt has been made to evaluate the mortality for various forms of treatment (Table 6). Ten of the 18 deaths followed either cesarean section or a Porro operation. Suppression of urine is a significant risk in these operations, as well as the danger of death from shock, hemorrhage and sepsis. Only 1 patient treated by the pack-and-Spanish-windlass method died. This patient was admitted with a severe toxemia, oliguria and jaundice and died undelivered. It seems unlikely that the outcome would have been different with any other form of treatment.

Table 6. *Influence of Treatment on Maternal Mortality.*

Treatment	No. of Cases	Deaths	Mortality per Cent
Cesarean section	104	7	6.7
Porro operation	10	3	30.0
Pack and Spanish windlass	32	1	3.1
Totals	146	11	

Fetal Mortality

Fetal mortality in such cases is always exceedingly high. Intrauterine asphyxia due to disturbances of the fetal circulation from separation of the placental substance accounts for the major portion of stillbirths. Prematurity plays an important role in the causation of neonatal deaths. The gross fetal mortality of this series, including nonviables, prematures and those dead on entry, was 54.3 per cent (Table 7). The net mortality, excluding all infants dead on arrival and those under 4 pounds, was 11.3 per cent.

Table 7. *Fetal Mortality.*

Condition of Baby		No. of Deaths	Per Cent of Births
Dead on entry to hospital		135	33.2
Alive on entry, delivered stillborn		32	7.9
Neonatal death		54	13.2
Under 4 lb.	40		
Over 4 lb.	14		
Total		221	54.3

Prognosis

Over 50 per cent of 104 cases with cesarean section had a febrile puerperium, as evidenced by a temperature of 100.4°F. or over on two successive days (Table 8). The morbidity of cases

treated by the pack-and-Spanish-windlass method was 11 per cent and was due solely to mild uterine sepsis. Nineteen of 103 women who had both albuminuria and hypertension returned to the Boston Lying-in Hospital for future confinements. There were no recurrent separations.

SUMMARY AND CONCLUSIONS

Premature separation of the normally implanted placenta has occurred once in every 90 deliveries at the Boston Lying-in Hospital since January 1, 1916.

Maternal toxemia is an important predisposing factor in its causation.

Table 8. *Puerperal Morbidity in 104 Cases with Cesarean Section.*

CAUSE OF MORBIDITY	NO. OF CASES
Uterine sepsis	37
Pyelitis	6
Abdominal wound sepsis	6
Bronchitis and bronchopneumonia	3
Peritonitis	2
Thrombophlebitis	2
Mastitis	1
Pulmonary embolism	1
Total	58

Early diagnosis is of prime importance in determining maternal mortality.

Expectant treatment should be reserved for mild cases of premature separation. Those with evidence of internal hemorrhage should be treated for shock and hemorrhage, and be delivered by the procedure which seems to be the least shock-producing under the circumstances.

Cesarean section has been utilized far too frequently in the past. Most cases will respond to simple rupture of the membranes or to the pack-and-Spanish-windlass method of treatment. Cesarean section should be reserved for cases where the baby is alive and viable and the mother in good condition, or where there is some contra-indication to pelvic delivery, such as previous cesarean section, non-dilated cervix or cephalo-pelvic disproportion.

Hysterectomy is indicated wherever the uterine musculature is unable to control hemorrhage during either the intrapartum or postpartum periods. With Porro operations there was a 30 per cent mortality. Uteroplacental apoplexy is not in itself an indication for hysterectomy, because a uterus so affected will in the great majority of cases contract satisfactorily following delivery, and can be safeguarded by massage, pituitrin, ergot and tamponade.

Toxemia and concealed hemorrhage are factors of considerable importance in determining maternal mortality. The gross maternal mortality for a group of 407 cases of premature separation treated at the Boston Lying-in Hospital from January 1, 1916, to January 1, 1938, was 4.4 per cent.

The gross fetal mortality was 54.3 per cent. The net fetal mortality, excluding all infants dead on entry and those weighing under 4 pounds, was 11.3 per cent.

Puerperal morbidity was over 50 per cent for cesarean section and 11 per cent for the pack-and-Spanish-windlass method of treatment.

A recurrence of premature separation in a subsequent pregnancy is extremely unlikely.

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OBSERVATIONS ON THE CLINICAL STATUS OF GASTROSCOPY*

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THIS paper presents some of the observations made in an attempt to estimate the clinical value of gastroscopy. The gastroscope used was the semiflexible one devised by Schindler. The rigid proximal portion of this instrument carries the eyepiece and the objective and reaches nearly to the cardiac orifice of the stomach. The distal division consists of a semiflexible and elastic portion, containing at the end a small, rigid device carrying an electric light and a window. Through the window the image of the gastric wall is reflected to the objective by a system of lenses. To the device carrying the light and window Schindler has attached a rubber finger, which so guides the instrument through the esophagus and stomach that the danger of perforation is rendered remote. Another important structural element is the mechanism which permits the gastric cavity to be inflated with air. Proper inflation is necessary in order to permit viewing the walls of the viscus.

Force must never be used in introducing the instrument. Sometimes resistance may be overcome by changing the angle of introduction. In other cases it is due to muscular spasm or organic obstruction, either in the esophagus or the stomach. Slight and continued pressure aided by the act of swallowing will overcome muscular spasm. If these measures fail, the instrument should be withdrawn. In addition to these precautions, gastroscopic observation should be preceded by x-ray evidence of patency of the esophagus. In the absence of organic obstruction, introduction of the gastroscope is usually a comparatively simple and quickly learned procedure. It causes less inconvenience to the patient than does the Ewald tube. On the other hand, it requires large experience so to manipulate the instrument that adequate visualization of all parts of the stomach is obtained, and proper interpretation of the findings is difficult.

Only after careful observations have been made on one or two hundred patients is the student of gastroscopy in a position to work without supervision. Even with considerable experience some lesions within the gastric mucosa may be overlooked and erroneous diagnoses made. In our own experience, the greatest difficulty arises in differentiating hypertrophic gastritis and cancer of the stomach. This is primarily due to the fact that one can neither palpate the thickness of the gastric wall nor obtain a biopsy specimen through the Schindler gastroscope. In 2 cases in which our gastroscopic diagnosis was carcinoma of the stomach, such a lesion was not found at operation. Other errors of observation or interpretation occur. Lesions may be overlooked, particularly those on the lesser curvature of the antrum and on the posterior wall of the cardiac end of the stomach. Unless the stomach is properly evacuated before the examination, certain areas otherwise visible through the gastroscope may be obscured by gastric secretion, mucus or food remnants. This occurs most frequently in patients with considerable gastric residue.

Contrary to the published opinion of Schindler and his co-worker,§ we find ourselves unable in some cases to differentiate, on a single gastroscopic examination, an indurated gastric ulcer and an ulcerating carcinoma. If one has the opportunity to follow the course of the ulcerating lesion by repeated examinations, the differential diagnosis becomes much easier and often obvious. Lesions outside the stomach, such as duodenal ulcer, gallbladder disease and so forth, cannot of course be visualized through this instrument. However, the accompanying changes within the gastric mucosa can be seen, and they may lead to wrong diagnoses unless the evidence obtained by all other methods of examination is also considered.

Naturally, contraindications to the use of the gastroscope exist. These are of both absolute and relative character. The absolute contraindications are: too great resistance to the passage of the instrument, due either to organic or to spasmodic obstruction such as cardiospasm; any condition which prevents the proper extension of the head, such as hypertrophic arthritis of the neck; extensive bony deformities of the chest; uncontrollable cough; acute oral or respiratory disease; orthopnea, asthma and other conditions with comparable dyspnea; laryngeal spasm; aneurysm of the aorta; corrosive gastritis; perforation or threatened perfo-

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§Schindler, R., and Giere, N.: Gastric surgery and gastroscopy: differential diagnosis of benign and malignant lesions; operability of tumors as determined by gastroscopy; early diagnosis of gastric carcinoma; the postoperative stomach. Arch. Surg. 35:712-765, 1937.

ration of the stomach or duodenum; acute peritonitis; active hemorrhage of the upper digestive tract; and shock. The more important relative contraindications are: angina pectoris; coronary disease; psychoses; and lack of co-operation by the patient.

In practice the contraindications to gastroscopy are of relatively infrequent occurrence. Nevertheless their existence, together with the diagnostic efficiency of radiography, has caused the medical profession seriously to question the practicability of gastroscopy. There are at least two important reasons for this attitude. One is that the semiflexible gastroscope is a relatively new instrument and the medical profession has not generally become aware of its value. Many physicians apparently consider gastroscopy extremely trying or even dangerous to the patient. Indeed, a prominent practitioner of Boston advised his patient that gastroscopy was more dangerous than an exploratory laparotomy. However, that gastroscopy is neither unduly trying nor dangerous to the patient is evidenced by our experience. Another reason for this attitude of the profession is that gastroscopy obviously permits only an examination of the interior of the gastric cavity. On the other hand, radiography permits examination of the entire gastrointestinal tract, the gall bladder, liver, kidneys and other organs. Because of its comprehensiveness and reliability, the medical profession often fails to realize the limitations of x-ray examination. This is readily explained when one considers that the majority of physicians have little understanding of x-ray technic and that the radiographer's findings are usually checked by surgical or autopsy observations only in the presence of advanced organic lesions. Thus, only since the advent of practical gastroscopy has there been an efficient means for checking negative gastric x-ray findings.

Various conditions are encountered which limit x-ray observation of the stomach; for example, the upper end of the stomach is difficult to visualize adequately. This fact is illustrated by one of the findings occurring during our early experience. An infiltrating, ulcerating lesion near the cardiac orifice was observed through the gastroscope. Four different barium x-ray examinations were required to demonstrate this known cancerous lesion.

The cardiac portion of the stomach is the most difficult to visualize by x-ray. Thus the demonstration of ulcer in the upper end of the stomach is peculiarly uncertain. For this reason gastroscopic inspection of the upper portion of the stomach is an unusually valuable diagnostic adjunct, as the following case report illustrates:

Case 1. M. D. (O.P.D. No. 514923), a 45-year-old man, had moderately advanced active pulmonary tuberculosis. He gave a history characteristic of peptic ulcer, the pain occurring in periodic attacks 30 minutes after eating. There had been neither hematemesis nor melena. Other than the lung findings, the physical examination was negative. On gastroscopy a fairly large ulcer with a deep crater was observed on the posterior wall of the fundus. This ulcer was not demonstrated on x-ray examination.

Ulcers on the posterior wall of the stomach are admittedly difficult to demonstrate radiographically, and for this reason may be overlooked. A typical case follows:

Case 2. J. H. (No. 889328), a 45-year-old man, was admitted to the hospital in February, 1938. He had been apparently in good health until the day before entry, when he felt nauseated and vomited bright-red and dark blood. Later, tarry stools were passed. The patient was confined to bed and given a Sippy diet. He was discharged symptom-free after 3 weeks of hospitalization. He remained without symptoms for 5 days. He then vomited a pint of fresh blood on two occasions, about 1 hour apart. On readmission he was somewhat pale. The physical examination was entirely negative. The hemoglobin was 68 per cent, the red-cell count 3,800,000 and the white-cell count 8600. Two weeks later an x-ray examination showed no evidence of gastric or duodenal lesions; no esophageal varices were demonstrable. Gastroscopy disclosed a small, benign peptic ulcer on the posterior wall in the upper third of the stomach.

Occasionally a gastric ulcer may be repeatedly observed gastroscopically in a patient whose x-ray findings are persistently negative. As an example may be cited the following case:

Case 3. C. M. (O.P.D. No. 198984), a 50-year-old man, had visited the Out-Patient Department for 6 years. During this time he experienced periodic attacks of symptoms characteristic of peptic ulcer. X-ray studies, repeated many times during the course of his illness, failed to show abnormal findings anywhere in the gastrointestinal tract. However, gastroscopy showed an ulcer in the midportion of the stomach, on the posterior wall. Only after the site of the ulcer had been thus located was it demonstrated by radiography.

Occasionally even careful relief x-ray studies fail to reveal the presence of an ulcer which is in a most favorable region for x-ray demonstration. This is illustrated by the following case:

Case 4. L. D. (private patient), a 52-year-old man, gave a history of periodic attacks of epigastric pain characteristic of peptic ulcer. The appetite was good and the bowels fairly regular. There was no history of hematemesis, tarry stools or jaundice. Physical examination was negative. Two x-ray examinations, including the relief method, failed to demonstrate an ulcer. Gastroscopy showed a typical benign ulcer on the anterior wall of the antrum. The progress of the healing of this lesion was followed by gastroscopic examination.

Gastrojejunal ulcers can often be demonstrated by radiography. However, there are a certain num-

ber which cannot, but which can be visualized on gastroscopy. The following case serves as an example:

Case 5. I. C. (O.P.D. No. 400794), a 67-year-old woman, had received a diagnosis of "gastric ulcer" in England at the age of 12. Twelve years prior to entering the Out-Patient Department a subtotal resection for peptic ulcer had been performed. For the past year vomiting had occurred frequently a half hour after meals. The vomiting was preceded by nausea, and only rarely by pain. The patient had hypertension and hypertensive heart disease. The blood pressure was 210/110. The heart was moderately enlarged. Examination of the abdomen was negative. X-ray examination revealed no evidence of ulcer or other cause for the gastric symptoms. Gastroscopy showed an ulcer situated on the posterior wall of the stomach on the cephalad side of the stoma. The ulcer crater had sharply defined walls, the floor was bleeding and the whole lesion was surrounded by an area of acutely congested mucous membrane.

Polyps of the stomach are apparently more readily recognized by gastroscopy than by x-ray. This is illustrated by the following case:

Case 6. G. S. (No. 501649), a 40-year-old male, ingested Lysol in 1933. It burned his mouth badly and evidently produced corrosive esophagitis and gastritis. Since that time food had caused sharp, gnawing epigastric pain. Medical treatment for ulcer produced but little relief. About 3 weeks prior to his last examination he had a small hematemesis. The hemoglobin on admission was 82 per cent, and the red-cell count 4,350,000. The appetite was fairly good, and the bowels were regular. Physical examination was essentially negative. X-ray study of the gastrointestinal tract gave findings characteristic of duodenal polyps only. Gastroscopy showed a round polyp 1.5 cm. in diameter in the antrum, at the junction of the posterior wall and the greater curvature.

Not infrequently hemorrhages characteristic of ulcer occur in patients presenting the symptomatology of peptic ulcer, yet no x-ray evidence of either duodenal or gastric ulcer is found. In some of these cases, although gastrojejunostomy has been performed, the symptoms persist. Many of these patients are not afflicted with peptic ulcer, but gastroscopic examination shows hemorrhagic erosions or a frank hemorrhagic gastritis as the cause of bleeding. The following case serves as an illustration:

Case 7. A. M. (O.P.D. No. 498934), a 54-year-old man, had for 7 years had periodic attacks of epigastric pain developing 2 hours after meals. On one occasion he had passed copious tarry stools. Usually the bowels were regular and the appetite good. Physical examination was negative. X-ray examination demonstrated no organic lesions in either the stomach or the duodenum. However, gastroscopy showed the entire posterior wall of the stomach to be a bleeding mass, owing to a marked hemorrhagic type of hypertrophic gastritis.

Gastroscopy is the only efficient means of diagnosing gastritis. Experience has shown that radiographic findings in gastritis are very uncertain. The following case serves as a typical example:

Case 8. I. D. (O.P.D. No. 502043), an 18-year-old girl, had for 18 months had occasional attacks of upper abdominal pain, beginning in the epigastrium and radiating along the rib margins to the dorsolumbar region. It was paroxysmal and severe in character, and persisted for 12 hours. Physical examination was normal. The usual clinical examinations of the blood and urine were negative; however, neither was examined during an attack of pain. A blood Hinton test was negative. X-ray examination of the stomach by the relief method showed "extreme hypertrophy of the mucosal folds." However, gastroscopic inspection of the entire gastric cavity showed the mucous membrane to be normal in all respects, and the rugae were nowhere enlarged.

Combining radiographic and gastroscopic examinations is often of great diagnostic value. The practicability of this combination is exemplified in the following case:

Case 9. C. S. (private patient), a married woman of 33, complained of epigastric pain. In February, 1933, she gave a history of 7 years' duration, the symptoms being constipation, belching, epigastric discomfort and occasional attacks of sharp epigastric pain, radiating to the dorsolumbar back. Physical examination and barium x-ray gastrointestinal studies at that time were negative.

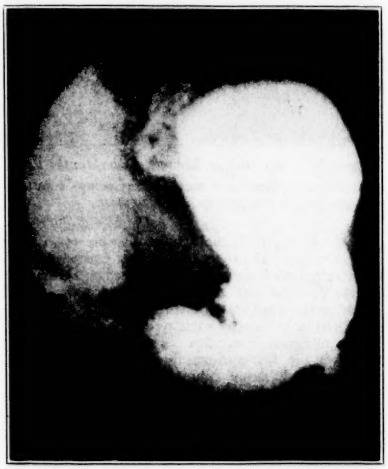

Figure 1. *X-ray Film of Stomach before Operation. The stomach is shown to have an entirely normal outline.*

In October, 1936, the patient passed several tarry stools. Palpation of the abdomen gave the suggestion of an epigastric mass. The stools showed a positive occult blood test. However, gastrointestinal x-ray studies were again

negative. In July, 1937, an attack of excruciating pain requiring morphine for relief developed in the right upper abdominal quadrant. At this time the patient was 8½ months pregnant. A normal delivery of an 8-pound girl occurred 10 days later. After delivery the symptoms changed markedly. The patient complained of severe epigastric pain 2 hours after meals, and also between 1:00 and 3:00 a. m. The pain was relieved by food or soda. At this time an x-ray study was again negative (Fig. 1). An exploratory laparotomy revealed a large mass originating in the cardiac portion of the stomach. It was uncertain whether the mass was benign or malignant.

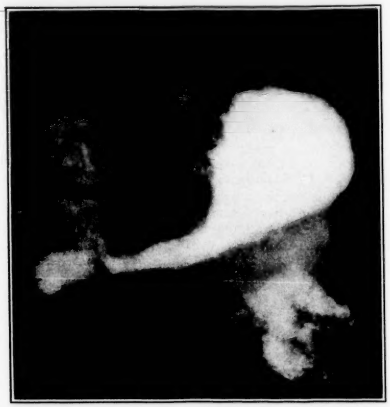

Figure 2. *X-ray Film of Stomach Four Months Later. In this film there is a marked narrowing, a lessened capacity and an irregularity of the stomach.*

In November, 1937, the first gastroscopic examination was performed. The rugae in the upper end of the stomach were tremendously enlarged, reddened and edematous. On the posterior wall of this region there was a deep ulceration about 0.5 cm. in diameter. The findings were considered to be those of some type of malignant disease, such as malignant lymphoma. Thus gastroscopic inspection gave the first definite findings indicating malignancy. During a second examination, performed 2 months later, the instrument could not be introduced beyond the upper third of the gastric cavity. In this region the findings were comparable to those previously described. At this time x-ray examination showed marked involvement of the whole stomach. The lower two thirds of the stomach was contracted to a narrow cylinder (Fig. 2). The patient during the latter part of January, 1938, rapidly began to lose weight and strength. A tumor mass was definitely palpable in the epigastrium; it enlarged very rapidly and ascites developed. The patient died in March, 1938, and autopsy revealed a Krukenberg tumor.

Observations have shown that the gastroscope can be used to advantage in many cases of established carcinoma of the stomach. Among these uses is the delineation of the extent of involvement of the stomach wall. In sufficiently experienced hands this can be done with greater exactness than through radiographic studies. Another use is the aid gastroscopy often gives in the differential diagnosis of benign and malignant ulcers of the stomach. An example is furnished by the following case:

Case 10. A. E. (O.P.D. No. 525172), a 50-year-old man, gave a history characteristic of peptic ulcer. The physical examination was normal. Gastric analysis showed gastric hyperacidity. On two different occasions x-ray studies disclosed a large ulcer on the lesser curvature of the stomach. The radiographer made a positive diagnosis of cancer on both examinations. However, gastroscopically the lesion observed was characteristic of benign ulcer, and on repeated observations the lesion almost disappeared under medical treatment.

SUMMARY

The findings which have been discussed exemplify those obtained from gastroscopic examinations at the Boston City Hospital; they represent one phase of a study which aims to establish the role of gastroscopy in the hospital's clinics. The study included medical and gastrointestinal examination as well as x-ray examination. Its results again emphasize the great importance of radiography in gastrointestinal diagnosis. However, they also demonstrate the already known but often overlooked limitations of the x-ray in the diagnosis of gastric lesions. The study shows further that gastroscopy is a practical and valuable procedure in gastric diagnosis and is also of service in following the progress of gastric disease and that the procedure is not objectionable to the patient.

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THE TREATMENT OF COLLES'S FRACTURE

FREDERIC J. COTTON, M.D.*

BOSTON

THE treatment of Colles's fracture is a matter of importance because wrist fractures are and will always be treated by the general practitioner. Abraham Colles, in a marvelously accurate and compact paper in the *Dublin Medical Journal* for 1825, described the gross lesion once and for all time. Dupuytren also described it, and on the Continent the lesion still bears his name.

With the advent of the x-ray the detail lesions of the bones were amply studied. Nothing of importance has been added until Taylor's recent study of the lesions of the triangular ligament. This has not yet been evaluated clinically but may prove to be important.

MECHANISM

A great deal of argument went on for many years regarding the mechanism producing a Colles's fracture. Dupuytren's followers held the theory that the evulsion strain from forced hyperextension, *fracture par arrachement,* caused the fracture. They seem to have been wrong.

Experimental evidence and that furnished in the cases of wrist fracture caused by the backfiring of an automobile while cranking the motor seem to make it clear that hyperextension gives a transverse break of the bones at the wrist and that these fracture lines often only cross the radial styloid to the middle of the joint. This is *not* a Colles's fracture.

The mechanism of Colles's lesion seems to be one of a cross-breaking strain, often with a secondary hyperextension. The mechanical theory of production of the fracture is not very important perhaps, when one is concerned with its treatment.

REDUCTION

Much of the literature is concerned with the reduction of the total deformity, which is assumed to be a displacement backward of the lower fragment in toto, with the breaking up of the impaction. As a matter of fact the typical "silver-fork" deformity results usually from a tilting backward of the lower fragment rather than a total displacement. The impaction is rarely solid enough to present any real problem in reduction. After reduction the stress seems to have been laid in the main on ulnar abduction without regard to the anteroposterior relations. This is shown by the common use of the Nelaton pistol splint and many other similar splints.

Moreover there grew up a teaching — we were all taught it in school — that the deformity once reduced did not tend to recur. This is not true. Many of us have had the chance to follow a number of cases, in which there was x-ray evidence of the unreduced fracture, then of the reduced fracture, then of the recurring deformity, while the wrist was still in splints. There is good reason, in fact, to think that many recurrences of deformity are directly due to improper splinting.

Up to the turn of the century no considerable progress had been made in treatment of Colles's fracture save for recognition of the terrible results of overlong splinting, which resulted in stiffness of the fingers. It is known that poor reduction and prolonged routine splinting failed to produce satisfactory results. David W. Cheever, clearest-headed of teachers, used to lay down the rule that every case of Colles's fracture showed permanent deformity — at least on the ulnar side. This was true then and is largely the case today, but it can be avoided.

Surgeons experimented with various treatments; and in Philadelphia, Moore used the position of flexion that we so strongly favor today — though in a little bit different fashion. The Lewis splint and the old Day carved-wood splint showed at least an understanding of the importance of the radial curve. But, only recently has any consistent method of reduction and of aftercare been formulated so as to gain general acceptance.

METHOD

The method rests on the general theory of reduction by reversing the mechanism of displacement with a minimum of trauma, and it seems to work. There is nothing sacred about the theory of "reducing them the way they came out," but in this instance practice seems to fit in with theory.

Reduction may be subdivided into the following steps:

1. Loosening the impaction. The impaction is rarely very solid, and as a rule, one hardly ever feels the impaction's giving way. Any violent hyperextension to clear impaction means only needless trauma.

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2. Reduction of the lower fragment forward on the upper if necessary. As a rule, the "silver-fork" deformity is a result of angulation rather than displacement.

3. Reduction of the dorsal inclination of the radial joint surface. The normal forward palmar inclination of the radial joint surface averages about 15 degrees. As the fresh fracture cases come to us, this inclination is reversed to 15 or 20 degrees of dorsal extension. We prefer to correct this, on theoretical grounds, by reducing into pronation.

4. Reduction of the head of the ulna. The displacement is about the ulnar head, which is torn more or less loose from its attachments, and the styloid is usually broken off. We prefer, again on grounds of theory, to reduce this by using the ulnar head as a fulcrum. Incidentally this is mechanically a most convenient mode of reduction. The degree of ulnar abduction necessary must be judged according to the x-ray findings.

5. Maintenance of the position secured at reduction. This must be held until the permanent support is applied.

MAINTENANCE

The reduction should be maintained with the hand and wrist in a position of flexion — gravity flexion, not forced flexion. The elbow is rested on a table, the forearm supported by the assistant, and the hand allowed to drop forward. The hand is not held. A full plaster cast is then applied, without too much padding. Thumb pressure on the palmar side of the ulnar head, indenting the plaster, adds security. The cast need not be split, but it is safer to do so. The split is made on the ulnar side and is spread about 4 mm. Some surgeons prefer a two-piece molded splint, fixed with a few turns of plaster; some use the sugar-tongs pattern. The exact method is immaterial: what matters is the maintenance of unforced flexion.

Such a cast need not stay on over ten days. Then the wrist should be placed between a pair of splints which are heavily padded to insure maintenance of partial flexion. After a few days these pads are reduced in thickness. The average case is out of splints and in a wrist strap in from three and a half to four weeks. The fingers are constantly exercised before the cast is removed, and careful wrist exercises under supervision may be begun in two weeks. This schedule is of course not hard and fast; it depends a bit on the solidity of the bones and the amount of comminution.

RESULTS

Given such reduction and treatment, there is little if any deformity. Function is restored within eight or ten weeks, and a good result obtained. The above schedule applies to the typical Colles's fracture.

Not very rarely there are cases which do poorly — cases of the neurotrophic imbalance, long since recognized, which we have come to call Sudek's atrophy. In such cases there is stiffness associated with cyanotic pallor, a cool, glazed skin and often a diminished, or intermittently diminished, pulse. A marked osteoporosis of the bones of the hand as well as of the wrist occurs later. These cases often do poorly under physiotherapy, but treatment by protein "insult" — namely, protein injected intravenously — has proved consistently useful. This is the same therapeutic measure that has long been used for arteriospasm in Berger's disease and in certain types of intermittent claudication. Typhoid vaccine seems to work most reliably.

VARIANTS

A "reversed" Colles's fracture of course requires a reversed mechanism in reduction and maintenance. Such cases are rare.

If the line of fracture is markedly oblique upward and outward it obviously calls for ulnar abduction to be maintained by a plaster cast extending above the elbow. The sugar-tongs or pistol type of splint will maintain this ulnar abduction.

More important and commoner variants of Colles's fracture are the cases with unusually extensive comminution of the radius. A plaster cast is useless, and the only recourse is traction, either finger traction or Murray's scheme of a Kirschner wire through the bases of the second, third, fourth and fifth metatarsals. This later method has the advantage of allowing free motion of the thumb and fingers.

The "chauffeur's" fracture is a break across the radial styloid to the middle of the joint surface. The bone is usually not displaced, and the radius is not comminuted. The maintenance of exact position for two or three weeks, or at most a month, is the only treatment that is necessary.

COMPLICATIONS

Compound fractures are unusual. In all the cases I have seen, except two, the ulna has been thrust through the skin on the palmar surface. The two exceptions showed a compounding of

the radius, one with a forward and the other with a posterior break through the skin.

Nerve lesions are rare and, if present, usually involve the ulnar nerve, due to a thrust of the ulna. In one of the cases with a compound fracture, the ulnar nerve was torn. Pinching of the dorsal, sensory branch of the radial nerve by bone fragments has been seen four times. In each case another reduction was performed, with a freeing of the nerve; it was successful in all four cases. Median-nerve lesions have been reported by others; they are apparently a result of the hand and wrist's being maintained in forced flexion.

* * *

The usual case of Colles's fracture is common, and its treatment simple; but in order to obtain good results, the mechanics of the fracture and of its reduction must be well understood.

CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL

ANTEMORTEM AND POSTMORTEM RECORDS AS USED IN WEEKLY CLINICOPATHOLOGICAL EXERCISES

FOUNDED BY RICHARD C. CABOT, M.D.

TRACY B. MALLORY, M.D., *Editor*

CASE 24491

PRESENTATION OF CASE

A fifty-eight-year-old, married Nova Scotian dressmaker was admitted for persistent vomiting of seven days' duration.

Twenty-five years before admission she experienced her first attack of "gall-bladder trouble." She had severe right upper-quadrant pain radiating around to the back, frequent vomiting and jaundice. Her pain required daily morphine for a week. Since that time she had avoided eating baked beans, boiled cabbage and oranges which caused considerable gastrointestinal disturbance. Fatty and fried foods were avoided because she was afraid they would precipitate a recurrence, although they caused no symptoms the few times they were eaten. Two and a half years before entry she had had a second attack of right upper-quadrant pain radiating to the back and associated with vomiting. The pain and vomiting were intermittent over a period of five weeks, during which she was bedridden. Morphine gave relief for a few days. During the entire episode she had no jaundice and remembered no abnormal stools or urine. Eight months before admission she began to feel weak and anorexic. When she forced herself to eat she became nauseated and noticed gaseous distention. Associated with the anorexia was an almost continuous distress and dull aching in the right upper quadrant. Change in position and light massage often gave temporary relief. Three months preceding entry she had had an acute attack of sharp right upper-quadrant pain which radiated to the back and was associated with vomiting and right upper-quadrant tenderness. The pain came on suddenly and disappeared suddenly. No jaundice or abnormal stools or urine appeared. Three such attacks occurred over a period of four weeks. Seven days before admission she became nauseated and vomited three or four times during the night, without having eaten anything out of the ordinary. The following day she was very weak, although she worked throughout the day. Her abdomen gradually became distended, and that night she vomited 6 quarts of material which was brown, watery and bitter but had no definite fecal odor. There was no acute pain during the episode. For the next five days she vomited eight to ten times a day. She could retain nothing by mouth. Only one bowel movement occurred and that following an enema. Her urine became brown in color. The vomiting caused pain which radiated to the back. Tenderness in the right upper quadrant gradually increased. Her past history was noncontributory. Her father and one sister had asthma, her mother a small carcinoma of the skin.

Physical examination showed a well-developed, somewhat dehydrated woman in no acute distress. There was no jaundice. She was edentulous. Examination of the lungs was negative. A blowing systolic murmur and a questionable presystolic murmur were heard. The blood pressure was 105 systolic, 75 diastolic. The abdomen showed tenderness in the right upper quadrant. Pelvic examination was negative.

The temperature was 98.6°F., the pulse 96, and the respirations 25.

The urine examination was negative. The blood showed a red-cell count of 4,500,000, 80 per cent hemoglobin, and a white-cell count of 11,500. A blood Hinton test and a stool examination were negative.

X-ray films of the abdomen were negative. A gastrointestinal series showed that the pylorus opened readily. The duodenal cap was tremendously dilated. At the junction of the first and second portions of the duodenum there was marked narrowing, and it was only with much pressure that a small amount of barium could be forced into the second portion. The narrowing extended over a distance of 3 cm. The pancreatic side of the duodenum was more linear and smoother than usual, but the mucosal pattern showed no thickening or distortion. The duodenal loop appeared constantly widened, apparently due to pressure from the pancreatic region. In addition there appeared to be some pressure from above and to the right.

On the fourth hospital day an operation was performed.

DIFFERENTIAL DIAGNOSIS

DR. ROBERT R. LINTON: The story of this patient is a little disconnected, it seems to me, in that we first hear that she had trouble twenty-five years ago and then we are told nothing of what happened in the next twenty-two and a half years. Presumably she must have been fairly well.

The statement of her first attack of gall-bladder trouble is a little hard to interpret, and I suspect that it may be a little misleading. The only evidence that we have of trouble in the gall bladder

or at least in the common duct is the statement that at that time she was jaundiced. In going over the record you notice that she had not been jaundiced since that first occasion, and perhaps it is to question if she actually was jaundiced. As the record stands, her symptoms were relieved twenty-five years ago; this is consistent with gall-bladder disease and possibly stone in the common duct. The fact that she had no further attacks of jaundice, however, makes me think that the trouble was not in the common bile duct.

Two and a half years before entry she had a second attack, which was similar to the first except that she was not jaundiced. I presume it lasted a little longer, since she was in bed five or six weeks. Then she had recurrent episodes of pain which eventually ended in attacks of vomiting, and the vomiting was of considerable consequence as she raised 6 quarts of material at one time. Her urine at admission was brown in color. They do not make note of any bile in the urine; I presume it was concentrated due to dehydration and vomiting.

On physical examination they make a definite statement that there was no jaundice. There is very little if anything to deduce from the physical examination in the way of diagnosis. The patient, I believe, entered the hospital primarily because of duodenal obstruction. As shown by the x-ray there is a lesion which certainly is causing obstruction of the duodenum. It is up to me to make the decision as to what that lesion could be. I do not know whether it is fair to call on the radiologist before going farther.

Dr. Tracy B. Mallory: If you like.

Dr. Richard Schatzki: The film shows a large cap with a wide-open pylorus and an area of narrowing lying at the junction of the first and second portions of the duodenum. In the area of narrowing the mucosa appears to be preserved. That is practically all you can deduce from the films. There is no ulceration of the area.

Dr. Linton: That is what I understood from reading the history. There are certain possibilities that enter one's mind. First, let us consider gall-bladder disease. I think it is possible that she might have had gallstones, and early in the course of her disease, twenty-five years ago, she may have had a stone in the common duct which was passed. Others may have remained in the gall bladder, and it is conceivable that two and a half years ago one might have ulcerated through the gall bladder into the duodenum and that the stones were discharged in that manner. This could conceivably account for the deformity seen in the duodenum by x-ray. The chief thing that makes me think that this is not very likely is the fact that the x-ray did not pick up any fistulous connection between the gall bladder and duodenum; so I shall rule it out.

Secondly, the suggestion that there is something pressing into the duodenum from without raises the possibility of carcinoma of the head of the pancreas. However, I do not recall ever seeing a carcinoma of the head of the pancreas without jaundice.

Thirdly, one might consider a primary carcinoma of the duodenum, but I do not believe that the disease is common enough to warrant such a diagnosis.

The next thing to consider is ulcer of the duodenum which has constricted the duodenum. It is unusual to have an ulcer so far from the pylorus. Against this diagnosis also is the fact that the mucosa was intact. I do not believe that there could have been active ulceration, and in confirmation of this we have no note of blood in the stools or the vomitus.

The fifth condition which should be considered is a lymphoma of the intestinal tract, presumably of the duodenum, but from what I gather from the x-ray one cannot make a diagnosis of lymphoma from this picture.

That still leaves me considerably in doubt as to the exact cause of the obstruction, but in going over these possibilities it seems that the most likely one is a healed duodenal ulcer which has formed a cicatricial contraction of the duodenum, resulting in intestinal obstruction.

Dr. Wyman Richardson: Is it not possible for her to have had a big gallstone in the duodenum?

Dr. Linton: They do not stick in the duodenum.

Dr. Richardson: Not if they are big enough?

Dr. Linton: No; they usually pass down and cause obstruction of the ileum.

Dr. Mallory: I am sure that has been true of all the cases we have had in this hospital — all have been found in the ileum.

Dr. Linton: I still think she may have had gall-bladder disease with gallstones, but I do not believe that it plays any part in this picture.

A Physician: Could her symptoms have been due to adhesions?

Dr. Mallory: We have seen adhesions around the gall bladder produce deformity of the duodenum but never so much obstruction.

Dr. Schatzki: I have never seen this amount of obstruction caused by adhesions.

Clinical Diagnoses

Cholelithiasis and cholecystitis.
Carcinoma of duodenum.

Dr. Linton's Diagnoses

Healed duodenal ulcer.
Cholelithiasis?

Anatomical Diagnoses

Epidermoid carcinoma of the gall bladder with extension around the duodenum producing obstruction.
Operative wounds: posterior gastroenterostomy, enteroenterostomy, jejunostomy.
Ascites.
Pulmonary edema.

Pathological Discussion

Dr. Mallory: This patient was explored by Dr. Richard H. Sweet who found, as he entered the abdomen, the gall bladder presenting as a large rock-hard mass with numerous tumor-like excrescences. One of these he biopsied.

Following the operation the patient continued to vomit and two days later an enteroenterostomy and a jejunostomy were performed. The patient showed no improvement and died in a few days with the picture of widespread ileus. At autopsy there was no evidence of peritonitis, the surgical stomas were intact and patent, and no evidence of intestinal obstruction was found except in the duodenum.

The gall-bladder wall was about a centimeter in thickness and all of stony consistence. In the lumen about 40 faceted stones were found. There were no stones in the cystic and common bile ducts, and these ducts were not involved by the tumor. The liver showed an extensive infiltration of tumor about the gall-bladder bed but no distant metastases. Cancerous tissue had grown down from the gall bladder in two bands, which completely encircled the duodenum and met in the head of the pancreas.

CASE 24492

Presentation of Case

A twenty-two-year-old white, single male student was admitted complaining of weakness and precordial pain.

He enjoyed normal health until the age of sixteen years, when he developed an abscess in the left groin. This initiated a three-and-a-half-year period of hospitalization in a sanatorium, during which time three successive purulent lesions developed and drained through sinuses for almost a year. These were in the left groin, in the left sacroiliac region and on the left lateral aspect of the thigh. *Staphylococcus aureus* was cultured from the wounds, and guinea-pig inoculations were negative. Osteomyelitis was apparently present, but no bone operations were done. He was discharged well. Four months before entry his tonsils were removed at a doctor's office, following which he had an uneventful convalescence. No symptoms of any kind developed until three weeks before admission. He went swimming and felt unusually tired the following week. He then noticed an abrupt onset of pain "down the left sciatic nerve into the heel." Headache, chilly sensations, anorexia and two or three episodes of vomiting followed. He went to bed and remained there until entry. His physician found temperatures ranging as high as 104°F. Three days later pain was also experienced over the right sciatic nerve. The pain in both legs then subsided, but he remained generally ill. One week preceding entry a sharp stabbing pain occurred over the left precordium on taking a deep breath. Three days later this pain was very severe and restricted his breathing. It then slowly began to subside. No cough, sputum or hemoptysis appeared. Painful lumps developed under the skin of both forearms. He had had no joint pains. No appreciable loss of weight had occurred. His family history and past history were noncontributory.

Physical examination showed a well-developed, fairly well-nourished young man, who lay in bed breathing quite rapidly. His skin was pale and moist. The buccal mucous membranes showed two small hemorrhages on the right. The tongue was rough, red and centrally coated. The pharynx was negative except for redness of both posterior pillars. Over the anterior left chest, dullness continuous with that of the heart extended into the left axilla and into the base posteriorly. Tactile fremitus and breath sounds were diminished over this area. No rales were heard. The blood pressure was 110 systolic, 60 diastolic. The liver edge was tender and was palpated at the level of the umbilicus. A 1 cm. localized area of tenderness was found on the left costal border 3 cm. from the midline. The tip of the left little finger was red and tender. A movable tender 1 cm. subcutaneous nodule was present on the dorsum of the left forearm, and on the dorsum of the right forearm there was a diffusely swollen slightly tender area 3 by 5 cm. An occasional macule was also seen on the skin of the arms.

The temperature was 100°F., the pulse 108, and the respirations 24.

Examination of the urine showed a large trace of albumin, 2 to 4 red cells and many white cells and renal epithelial cells per high-power field and a large amount of granular debris. The blood showed a red-cell count of 4,800,000 with 95 per cent hemoglobin, and a white-cell count of 8150

with 88 per cent polymorphonuclears. The serum chlorides were equivalent to 96 cc. of N/10 sodium chloride. The serum nonprotein nitrogen was 62 mg. per cent, and the sugar 81 mg. A blood Hinton test was negative. Blood cultures and urine cultures contained *Staphylococcus aureus*.

X-ray films showed the left lung field to be smaller than the right. On the left there was diminished radiance, and the left pleura showed slight thickening along the axillary line. The costophrenic angles were clear. The heart and mediastinum were not displaced. In the lateral view there was a hemi-elliptical shadow against the posterior chest wall, measuring 2 by 4 cm. near the sixth interspace. It contained small areas of rarefaction suggestive of cavities. Films of the pelvis showed marked destruction of the left sacroiliac joint, with multiple areas of rarefaction and extensive new-bone formation. The joint was apparently fused. A small rounded area of bone destruction was seen below the sacroiliac joint at the medial aspect of the ilium. Within the body of the third lumbar vertebra there was an indefinite area of rarefaction, with a central oval area of density suggesting bone abscess with a small central sequestrum.

On the day of admission his temperature rose to 103°F., where it remained for two days. On the third hospital day the large subcutaneous lesion on the right forearm had become red, warm and tender. A diffuse macular rash was present on the fifth day; it originated on the right forearm and spread to the shoulders, left arm, chest, back and abdomen. A 1 cm. red, slightly raised macular spot appeared on the left knee. During the following two days 40,000 units of staphylococcus antitoxin was given with no noticeable effect. On the ninth hospital day a transfusion was given with blood from a patient who had had an intramuscular injection of sterile milk eleven hours previously. On the same day an intravenous pyelogram was done. One hour after intravenous injection of the dye no calices, pelvis or ureter could be seen on either side. The kidney outlines were fairly distinct and seemed to be increased in size. Shadows of the liver and spleen appeared large. Two days later the patient was much worse. The pulse rate was 130, the respirations 35, and the temperature 102°F. Dullness was present over the entire left lung. Numerous moist crackling rales were heard on the right posteriorly and inferiorly. On the following day four areas were surgically drained; each contained pus but all the abscesses were well localized. That evening he became delirious. A few hours later he was breathing heavily and moaning. His breathing gradually quieted down, and he died on the thirteenth hospital day.

Differential Diagnosis

Dr. Champ Lyons: It seems likely that the three-and-a-half-year period of hospitalization which occurred at the age of sixteen years can best be explained by a diagnosis of staphylococcal osteomyelitis of a vertebra with subsequent psoas abscess formation. It is not uncommon in adolescents to have an insidious onset of localized bone lesions in vertebral bodies, clavicle, ilium, ischium or pubis following minor staphylococcal infections of the skin. There is no history of antecedent furunculosis in this case, but it is quite likely that one could have been obtained had it been sought at the time. The fact that no bone operations were performed is also consistent with the diagnosis of vertebral osteomyelitis, and although he was discharged "well" it was more likely that he was discharged with healed sinuses.

Four months before admission to this hospital his tonsils were removed, but we have no information as to whether this was done as a routine measure or whether he had experienced a period of throat infections or of generally impaired health. In any event, there shortly followed an exacerbation of infection. The abrupt onset of pain radiating down the left sciatic nerve associated with headache, chilly sensations, anorexia and vomiting, with a swinging temperature going up to 104°F., indicated the existence of an acute intrapelvic inflammatory process. The chills and swinging temperature are consistent with a bacteremia, and the presence of chills makes it more than likely that the bacteremia was an intermittent one arising from an endovascular focus. There is no examination of the heart to exclude an active endocarditis as the focus. There are no quantitative blood cultures reported to confirm the impression that the bacteremia was intermittent rather than sustained. The chest pain and dullness are consistent with a septic infarct of the left lung, and it is on this finding that a diagnosis of septic phlebitis seems more likely as a cause of the bacteremia than one of septic endocarditis. The subsequent lesions on the extremities and the impaired kidney function are all consistent with the localized lesions resulting from the known pyemia. The white-blood-cell count of 8000 in the presence of such extensive infection suggests that there existed a leukocidin toxinemia in addition to the bacteremia. The last x-ray plates of the chest show a hemi-elliptical shadow which suggests the occurrence of an empyema in association with the

septic pulmonary infarction. There was obvious osteomyelitis of the left sacroiliac region and of the ilium. Death undoubtedly occurred from dissemination of the infection as a result of the bacteremia.

In retrospect it seems likely that there was an exacerbation of a quiescent focus of osteomyelitis, with the concomitant occurrence of septic endophlebitis and pyemia. This probably occurred at a time when his general physical condition was poor, but we have no direct proof of this other than the fact that he required tonsillectomy four months prior to the onset of this infection. Staphylococcus antitoxin produced no therapeutic effect, and it is unlikely that our present commercial antitoxin will produce any effect until it contains an antileukocidin, for it has been shown that the antihemolysin which is the active constituent of our present antitoxin probably has no effect on human infections. A transfusion with blood from a patient who had had an intramuscular injection of sterile milk was probably designed to increase the leukocyte count in a patient who had an obvious leukopenia. The objective is commendable, but the solution of the problem of dealing with leukopenia has not been found in the use of such transfusions.

It is my opinion that the autopsy will demonstrate two types of lesions. First, there will be multiple abscesses in the pelvis, left lung and pleural cavity, with smaller abscesses throughout both lungs, both kidneys and the liver. There may be a brain abscess. We know there was osteomyelitis of a vertebra and of the ilium. We have no information on which to exclude an endocarditis, but it is unnecessary to postulate its presence on the findings presented. It may not be possible to demonstrate the area of septic phlebitis, for this could well be confined to a staphylococcal infection of the bone marrow. Secondly, there will be evidence of leukocidin toxinemia. Sections of the marrow will probably show no mature granulocytes and present the picture of arrested maturation, although I believe that the picture is caused by destruction of adult granulocytes.

Clinical Diagnoses

Staphylococcus septicemia.
Amyloid disease of kidneys and liver.
Multiple abscesses.

Dr. Lyons's Diagnoses

Staphylococcus bacteremia.
Multiple abscesses of pelvis, lungs, pleural cavity, kidneys and liver.
Osteomyelitis of vertebra and ilium.
Leukocidin toxinemia, with hypoplastic bone marrow.

Anatomical Diagnoses

Septicemia, *Staphylococcus aureus.*
Multiple abscess formation: right lung, kidneys, heart and subcutaneous tissue.
Pericarditis, purulent.
Osteomyelitis, chronic, left sacroiliac joint and body of third lumbar vertebra.
Amyloid disease of liver, kidneys, spleen and adrenals.

Pathological Discussion

Dr. Tracy B. Mallory: The postmortem examination on this boy disclosed most of the lesions which Dr. Lyons predicted and several others as well. There was a very extensive *Staphylococcus aureus* pyemia, with multiple soft-tissue abscesses in the lung and kidneys and osteomyelitis of the third lumbar vertebra and of the region of the left sacroiliac joint. There was no empyema, but we did find a purulent pericarditis. It is claimed that purulent pericarditis in a septicemia arises only as a secondary infection from an abscess of the heart that has ruptured into the pericardial fat. Such an abscess is not always easy to demonstrate, but in this case there was an obvious myocardial abscess 6 mm. in diameter, as well as many minute epicardial abscesses. There was no endocarditis.

The most striking features of the autopsy were the enormously enlarged liver, spleen and kidneys. The liver weighed 3800 gm., the spleen 600 gm. and the pair of kidneys 800 gm. The tissues seemed slightly paler, firmer and more translucent than normal. Blocks of these organs treated with Lugol's solution at the time of autopsy showed a slight brown staining and led the prosector to a diagnosis of amyloid disease. This was readily confirmed histologically. The diagnosis could hardly have been made but might have been suspected on the evidence presented. Chronic discharging sinuses offered a suitable etiology. The enlargement of the liver and kidneys was clearly indicated, but the enlarged spleen was apparently not picked up clinically.

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Communications should be addressed to the New England Journal of Medicine, 8 Fenway, Boston, Mass.

TRANSFUSION OF INCOMPATIBLE BLOOD

The letter printed on another page of this issue of the *Journal* calls attention to the dangers arising from incorrect typing of blood for transfusion. Unfortunately, no mention is made in the communication of the thousands of transfusions safely given each year, and to the layman it might seem that this procedure, instead of being a lifesaving one, is as hazardous as a complete gastrectomy. On the other hand, to those acquainted with statistical methods, these five instances of the use of incompatible blood, four of them fatal, might appear an insignificant number; yet to our correspondent, and to others doing frequent blood typings, a single death from this cause is important and can only be due to flagrant negligence or to sheer ignorance. Since we have no right to assume that the individual who is called on to type a blood is cognizant of all the technical pitfalls but chooses to be careless, we are forced to conclude that trouble, when it occurs, is a result of insufficient knowledge

Not infrequently the laboratory technician is poorly trained, but it must be remembered that until the last decade or so the majority of technicians obtained their experience by looking over one-another's shoulders. The situation has improved considerably with the development of schools for technicians, but even in the better ones there is still a tendency to teach the traditional technic and procedures found in textbooks. One of the reasons for this is that practical knowledge is usually slow in getting into print. As an illustration, we wonder how many technicians (or interns, for that matter) could correctly answer the following questions. What effect may bacterial contamination of serums have on typing? What result may traces of alkali on the glassware have on agglutinins? Is the use of Type O (IV) stock serum necessary in typing? Of what use, if any, is lecithin?

The poorly trained technician, however, as our correspondent suggests, is no less at fault than the intern fresh from medical school. The latter, presumably, attended lectures on the agglutinative phenomena in his second-year course in bacteriology. Very likely he indulged in some laboratory exercises on blood typing. Nevertheless, to receive instruction from one possessing a masterly theoretical knowledge of the subject is one thing; to apply that knowledge practically is quite another. If our intern had had his laboratory exercises in blood typing in his second-year course in clinical pathology, he would be somewhat better off, since his instructors would probably have had recent clinical experience. But in either case, two years pass as a student before he is given the responsibility for typing a blood for an actual transfusion. And then as a house officer, poor fellow, he finds no one at hand who is willing — or possibly competent — to check his unpracticed attempts at a test on which depends the life of his patient!

The last statement in the letter should be amended: proper supervision of the laboratory work in *all* our hospitals is the problem.

A NEW BOOK ON PERSONALITY

Of special interest to the medical profession in general was the announcement last year from Harvard University that a new professorship in abnormal and dynamic psychology had been created and that the man selected to fill this position was a Massachusetts physician, Dr. Henry A. Murray, Jr. This appointment was an unusual and interesting act, for it recognized the contributions and ability of a man who is not only a student of psychology but also a competently trained clinician. For some time there had been a question as to how Harvard University might deal with the newer branch of dynamic psychology and its development. For several years a psychological clinic had been maintained at 64 Plympton Street, where investigation of psychological problems had been actively carried out. The leader of this clinic was Dr. Murray, who, surrounded by a group of coworkers selected and stimulated by him, carried on some extremely interesting work which forms the basis of his monograph on human personality that has recently been published.* Following his appointment, which came as the climax to this long period of active research, he was granted a leave of absence in order to prepare his material for publication. This volume formulates a new point of view about personality and its study, describes original technics for investigating psychological problems, and reports findings and results from a large group of cases studied intensively over a period of several years.

For a long time it has been realized that there is a gap, if not a chasm, between academic psychology and medical psychology. On the one hand, medical psychology has found itself bewildered by the complexity of clinical problems as they present themselves, and on the other, academic psychology has been relatively content to remain within the laboratory and limit its research to the psychology of perception and sensation. In the face of a rapidly growing field of knowledge, students have found themselves confused, and clinicians no less so. All are eagerly looking for leadership, and Harvard University is to be congratulated for the step it has taken.

In the last few years considerable development at Yale University has taken place along these lines, and its creation of the Institute of Human Relations has been signalized by the emphasis placed on the psychology of personality. Dr. Murray will inevitably bring to Harvard University the leadership that is needed, and his many friends in the medical profession feel a sense of satisfaction over the choice of so competently trained a man for this work. He carries on a tradition established in this community by Morton Prince, who was one of the first in New England to pioneer along the lines of the psychology of human personality and the organism as a whole.

The appearance of Dr. Murray's book on this subject is welcomed as a step forward through the darkness into a clinical field where further light is so badly needed.

*Murray, H. A., Jr.: *Explorations in Personality*. New York: The Oxford University Press, 1938.

MASSACHUSETTS MEDICAL SOCIETY

SECTION OF OBSTETRICS AND GYNECOLOGY

Raymond S. Titus, M.D., *Secretary*
330 Dartmouth Street
Boston

A series of selected case histories by members of the section will be published weekly.

Comments and questions by subscribers are solicited and will be discussed by members of the section.

Placenta Accreta

Mrs. A. D., a thirty-four-year-old gravida III, was delivered by forceps on August 24, 1930, after labor lasting five hours. The placenta was expressed twenty minutes later and was said to have been slightly adherent although the placenta and membranes were reported to have been complete.

The family history was not remarkable. Her past history included scarlet fever as a child and pneumonia in 1920. Catamenia had been normal, with a twenty-eight-day cycle, and lasted three days. Her last period had occurred on November 25, 1929, and her expected date of confinement was

September 2. There had been two previous pregnancies, both instrumental, the second being complicated by a retained placenta with manual extraction.

Physical examination on entrance to the hospital showed a woman at term, well developed and well nourished. The blood pressure was 110 systolic, 65 diastolic, and there was some edema of the feet and ankles. She was discharged from the hospital twelve days after delivery, after a normal afebrile convalescence.

Ten days later she was readmitted to the hospital because of two moderate uterine hemorrhages. Because of this bleeding, the patient was curetted and the uterus and vagina tightly packed with iodoform gauze. The pathological report of the curettings was as follows: "Retained placental tissue; old chorionic villi, in places calcified." The uterine pack was left in for four days. When it was removed, the patient had a very severe hemorrhage, and the uterus and vagina were again packed with iodoform gauze. On the following day her hemoglobin was 50 per cent, the red-blood-cell count 2,500,000, and the white-blood-cell count 19,000. She was transfused with 600 cc. of citrated blood, and a second transfusion of 600 cc. of citrated blood was administered the following day. Because of the amount of bleeding following the removal of the pack, it was felt that hysterectomy was indicated, and the following operation was performed: supravaginal hysterectomy, double salpingo-oophorectomy. The operation was performed under ether anesthesia, and after the uterus was removed, a cigarette drain was placed through the cul-de-sac of Douglas into the vagina. The uterus was sent to the pathologist. The patient made an uneventful convalescence and was discharged on the sixteenth day.

The pathological report was as follows:

> An opened postpartum uterus with tubes and ovaries attached. The ovaries are normal in appearance. The uterus measures about 15 cm. across, with a depth of about 15 cm. The uterus has been opened from above; lying behind the cervix and attached to the mucosa of the posterior uterine wall is a bloodstained spongy mass about 5 cm. in diameter.
>
> On microscopical examination no evidence of mucosa can be found anywhere. Aside from this the chief lesion present is an extreme sclerosis of the blood vessels in the inner portion of the wall, with obliteration of many of them due to organization of thrombi. This condition seems of long duration and connected with previous pregnancies. A second abnormality is the deep penetration of villi into blood spaces and their attachment in the walls in places, rendering removal of the placenta difficult. The decidual tissue lies between some of the muscle fibers instead of being on their inner surface, that is, on the inner surface of the myometrium, and is in large part hyaline owing to necrosis of the cells and disappearance of the nuclei. There is also necrosis of portions of the placenta, with acute inflammatory infiltration.
>
> Diagnosis: placenta accreta, with necrosis and acute inflammation.

Comment. It is not infrequent that cotyledons of the placenta are left in the uterus at the time of labor. Most of these are extruded normally without accompanying hemorrhage or evidence of infection. It is often difficult in examining a placenta after delivery to be certain that a small piece of it has not been left behind. It is wise never to investigate the inside of the uterus after delivery, even if one suspects that a cotyledon remains, unless there is bleeding. Sometimes these lobes of placenta will cause hemorrhages during convalescence and rarely such hemorrhages are serious; they usually are easily removed either by the finger or by the curet. Commonly these patients need transfusion because of the hemorrhage, but in a case such as this when hemorrhage follows the removal of the pack, one must think very seriously of the possibility of a placenta accreta. The operation of hysterectomy is the proper treatment when this diagnosis is made.

MEDICAL POSTGRADUATE EXTENSION COURSES

The following sessions, given by the Massachusetts Medical Society in co-operation with the Massachusetts Department of Public Health, the United States Public Health Service and the Federal Children's Bureau, have been arranged for the week beginning December 12:

BRISTOL SOUTH (New Bedford Section)

Friday, December 16, at 4:00 p. m., at the St. Luke's Hospital, New Bedford. Subject: The Control and Treatment of Respiratory Infection. (This is to include the serological treatment of pneumonia in infants and children.) Instructor: Charles F. McKhann. Robert H. Goodwin, *Chairman.*

ESSEX NORTH

Friday, December 16, at 4:30 p. m., at the Lawrence General Hospital, Lawrence. Subject: Gonorrhea — Modern Treatment of Gonorrhea. Instructor: Roger C. Graves. John Parr, *Chairman.*

ESSEX SOUTH

Tuesday, December 13, at 4:00 p. m., in the Nurses' Home of the Salem Hospital, Salem. Subject: Heart Disease — The Treatment of "Heart Attacks" or "Cardiovascular Emergencies." Instructor: Samuel A. Levine. Walter G. Phippen, *Chairman.*

HAMPSHIRE

Wednesday, December 14, at 4:15 p. m., in the Nurses' Home of the Cooley Dickinson Hospital, Northampton. Subject: The Toxemias of Pregnancy. Instructor: Judson A. Smith. Warren P. Cordes, *Chairman.*

NORFOLK SOUTH

Monday, December 12, at 8:30 p. m., at the Quincy

City Hospital, Whitwell Street, Quincy. Subject: The Indications and Contraindications for Removal of Tonsils and Adenoids. Instructors: Joseph Garland and Charles I. Johnson. David L. Belding, *Chairman.*

PLYMOUTH

Tuesday, December 13, at 4:00 p. m., in the Rosa Field Nurses' Residence, Brockton Hospital (rear of hospital), Brockton. Subject: Bright's Disease and Hypertension — Evaluation of New Therapy: Diagnosis. Instructor: Robert S. Palmer. Walter H. Pulsifer, *Chairman.*

WORCESTER

Tuesday, December 13, at 8:30 p. m., in the Nurses' Home of the Milford Hospital, Milford. Subject: Operative Obstetrics. Instructor: Roy J. Heffernan. Joseph Ashkins, *Chairman.*

WORCESTER NORTH

Friday, December 16, at 4:30 p. m., at the Burbank Hospital, Fitchburg. Subject: Anemia — Modern Methods in Diagnosis and Treatment of Blood Dyscrasias. Instructor: Chester S. Keefer. George P. Keaveny, *Chairman.*

DEATHS

ANDREWS — J. H. Andrews, M.D., of School Street, Hyannis, died November 22. He was in his sixty-third year.

Dr. Andrews received his degree from the Harvard Medical School in 1902. He was a member of the American Medical Association and of the Massachusetts Medical Society.

For fifteen years he was a member of the staff of the Cape Cod Hospital.

MOWER — Etamer A. Mower, M.D., of 85 Williston Road, Brookline, died November 29. He was in his forty-fourth year.

Born in Russia he graduated from the St. Louis College of Physicians and Surgeons in 1921 and from Laval University Faculty of Medicine, Quebec, in 1934. Dr. Mower had been chief surgeon at the Cambridge Relief Hospital for four years, having previously had a private practice in Malden.

He was a member of the American Medical Association and of the Massachusetts Medical Society.

His widow, two sons, two sisters, a brother and his mother survive him.

MISCELLANY

SPECIFIC TREATMENT FOR PNEUMOCOCCAL PNEUMONIA

As the season of increased prevalence of pneumococcal pneumonia approaches, it seems desirable again to call attention to certain matters pertaining to the disease, the importance of the recognition of types of pneumococcal infection and the application of specific treatment.

Pneumococcal pneumonia is usually lobar, but any one type of pneumococcus may cause either lobar or bronchopneumonia, and it is desirable to determine the type of pneumococcal infection in all cases. About 60 per cent of the cases are due to Type 1, 2, 3, 5, 7 or 8.*

Pneumococcal pneumonia is among the leading causes of death. The case fatality rate of Type 1 pneumococcus pneumonia untreated with serum is approximately 30 per cent and of Type 2 about 43 per cent. Of 1451 Type 1 cases in the Massachusetts pneumonia series which were treated with serum within the first four days of the illness 194, or 13.3 per cent, died. Of 368 Type 2 cases similarly treated 80, or 21.7 per cent, died. The experience in Massachusetts and elsewhere has demonstrated that specific treatment can be successfully used by physicians in general practice. It may be expected to reduce the case fatality rate in Types 1, 2, 5, 7 and 8 by one half or more.

Success in specific treatment depends for the most part on the early use of serum. Thus the type of pneumococcal infection should be determined at the earliest possible moment. The importance of the time element is emphasized by the experience in Massachusetts. Of 1205 Type 1 cases treated during the first three days, 145 (12 per cent) died and of 246 treated on the fourth day, 49 (19.9 per cent) died. If patients with Type 1 pneumococcus pneumonia are treated within the first twenty-four hours, the fatality rate may be reduced to 5 per cent.†

DETERMINATION OF TYPE

The type of infection is more readily determined by examination of the sputum than by other means. The specimen should come from the lung with as little admixture of saliva as possible. It is desirable to obtain at least a teaspoonful of sputum, which is collected in a clean, wide-mouthed bottle or cardboard sputum box; this should be sent at once to the nearest laboratory equipped for typing. Special containers are available through local boards of health. *No antiseptic* should be added to the sputum; tuberculosis sputum outfits should not be used as they contain carbolic acid.

The Neufeld method of typing is rapid, simple and reliable. It is applicable to pneumococci from any source and often permits identification of type within a few minutes.

Typing will be done without charge at the State Bacteriological Laboratory, Room 527, State House, Boston. When necessary, typing of sputum from patients with pneumonia will be done during the night or on weekends or holidays. Such specimens should be left with the State House guard. All sputums showing Type 1, 2, 3 5, 7 or 8 pneumococci and certain other types for which serums may be available are reported by telephone or telegraph, prepaid.

In addition to the State House laboratory, approved typing facilities are available at other Boston hospitals — Carney, Faulkner, Massachusetts Memorial and St. Elizabeth's — and elsewhere in the State. A list of approved typing stations will be published later in the *New England Journal of Medicine* by the Massachusetts Department of Public Health. The charges for the typing depend on the laboratory. If the patient is unable to pay, arrangements can be made at an approved laboratory for typing from sputum, blood culture or other material free-of-charge.

SERUM TREATMENT

At present in Massachusetts therapeutic antipneumococcus serums are available against Types 1, 2 and 5. In the near future it is planned to distribute therapeutic serums against Types 7 and 8. Antipneumococcus serums are available to physicians through the State Bacteriological

*Bullowa, J. G. M., and Wilcox, C.: Endemic pneumonia; pneumococcic types and their variations in incidence and mortality for adults and children. Arch. Int. Med. 59:394-407, 1937.

†Cecil, R.: Effects of very early serum treatment in pneumococcus type 1 pneumonia. J. A. M. A. 108:689-692, 1937.

Laboratory, Room 527, State House, Boston, or through approved laboratories, provided that

(1) Sputum or other material from the patient is first typed and found to contain Type 1, 2, 5 or other type of pneumococcus against which serum is available.

(2) As soon as the patient is discharged, the physician agrees to make a report to the Massachusetts Department of Public Health on a form enclosed with the serum.

It is impossible to outline any schedule of dosage which will apply to every case. It is important to remember that successful serum therapy is chiefly dependent on early and adequate specific treatment and on variation in dosage in accordance with the needs of each case. Delay may entail the risk of death and the time-consuming administration of extra doses of serum.

At present, it is recommended, subject to the precautions which must be observed with respect to treatment with horse serum, that patients with Type 1 pneumococcus pneumonia be given an *initial course of injections* totaling *at least* 60,000 units, with Type 2, 5 or 8 *at least* 100,000 units, and with Type 7 *at least* 60,000 to 90,000 units. This initial dose should be at least doubled, if

(1) Treatment is begun after the third day of the disease.

(2) The patient is over forty years of age.

(3) The patient is pregnant or in the first week of the puerperium.

(4) There is involvement of more than one lobe.

(5) Pneumococcal bacteremia is known to be present.

When two or more of these circumstances are present, it is desirable to give more than double the usual dose in the initial course of injections.

It must be appreciated that the number of units suggested above refers only to the dosage in the *initial course of injections* and does not imply that specific treatment should stop there. The use of the term *initial course* is of itself an intimation that further doses may be desirable.

Bacteremia occurs in about one quarter of the cases with Type 1 and one third of those with Type 2 pneumococcus pneumonia and is a very serious condition. Thus, information in relation to bacteremia is of great importance in treatment. It is desirable to make a blood culture in each case before the first dose of serum is given. If the blood culture is positive, or if negative and the progress of the case is unsatisfactory, it is desirable to continue to take blood cultures at intervals of about twenty-four hours or oftener.

Blood-culture medium should be a part of the equipment of every physician who treats pneumonia. With the patient in a hospital and the laboratory nearby, culture medium in cotton-plugged flasks can be utilized. For use in the home, culture medium in bottles, to avoid contamination in transit, is available at approved typing stations. Blood cultures may be sent for examination to the nearest approved laboratory and in the vicinity of Boston to the State Bacteriological Laboratory.

In many cases only a beginning has been made with the initial course of injections, and subsequent dosage must be estimated in accordance with the needs of each case. *Additional* individual doses of 40,000 to 60,000 units are recommended at intervals of every three or four hours in *severe* cases and in any case, if

(1) The temperature does not fall below 102°F. by rectum within twelve hours of beginning serum treatment.

(2) Having fallen below 102°F. by rectum, it again rises above this level.

(3) Bacteremia is demonstrated by blood culture regardless of the clinical course.

(4) There is evidence of a spreading lesion.

In the presence of two or more of these circumstances, it is desirable that the serum be given in the larger individual doses mentioned above and for a longer period.

If the patient fails to improve within twenty-four to forty-eight hours, another specimen of sputum should be sent to the laboratory for typing. Failure to improve after the serum has been given *persistently* for forty-eight hours suggests the presence of some complication, such as empyema. A blood-culture should be taken and the patient examined for signs of complications.

Further information concerning the administration of serum will be found in the circular accompanying the serum. The directions given in the circular should be followed in detail.

NURSING SERVICE

Clinical experience has shown that patients receiving *prompt* medical and nursing care have the best chances of recovery. In almost every part of the State, nursing service on a visit basis is available through the visiting nursing associations for patients who do not need or who cannot afford a special nurse. In Boston the Community Health Association will give nursing care on a visit basis on the order of a physician.

PNEUMONIA COMMITTEE, BOSTON HEALTH LEAGUE
DR. FREDERICK T. LORD, *Chairman*,
MISS DOROTHY J. CARTER,
DR. FRANK CRUICKSHANK,
DR. REGINALD FITZ,
DR. DWIGHT O'HARA,
DR. FRANK R. PHILBROOK,
DR. ALTON S. POPE,
MISS MARGARET H. TRACY, *Secretary*.

"YOUR HEALTH" BROADCASTS

The next series of "Your Health" broadcasts, sponsored by the American Medical Association and the National Broadcasting Company and heard over the Blue Network each Wednesday at 2:00 p. m., is entitled "Let's Eat!" It consists of four broadcasts as follows:

December 14. What Shall We Eat?
A well-rounded diet and how to get it.

December 21. Hidden Treasures in Foods.
More about a balanced diet in special relation to minerals and vitamins.

December 28. Good Milk, Good for You.
The production, transportation, pasteurization and home care of milk; its place in the diet; processed milks.

January 4. Fool's Gold.
Facts versus fallacies in relation to false notions on diet.

HEALTH OF THE NATION

Although the reported number of cases of influenza (3836) over the country for the month ending November 5 was about 50 per cent higher than the average incidence for this period through the five-year median,

1933-1937, no fears of unusual prevalence are yet expressed by the United States Public Health Service.

During this current four-week period the incidence increased about 45 per cent over the preceding four weeks, but such an increase is normally expected at this season of the year. It was about 35 per cent above the figure reported for the corresponding period in 1937. While the number of cases so far this year for the country as a whole has not been unduly large (53,784), the incidence has maintained a relatively high level since the latter part of the summer.

For this same period, measles cases showed a reduction of 25 per cent under last year; and scarlet fever, 25 per cent below the five-year median and 10 per cent under last year, remained "relatively low." Spinal meningitis continued "very favorably" with a total of only 168 cases as compared with 246 in the same period last year.

After a period of comparatively high incidence, the number of cases of smallpox has dropped to a more normal level — almost 50 per cent below last year's figures for the same period.

While diphtheria during these four weeks was somewhat more prevalent than for the same time last year, it was still less than 80 per cent of the 1933-1937 average incidence.

For these four weeks, also, the number of typhoid and poliomyelitis cases reported was the lowest on record in the decade for which similar data on these diseases are available.

Altogether the communicable disease situation is quite favorable. — *Public Health Reports,* November 25, 1938.

THE ELLA SACHS PLOTZ FOUNDATION FOR THE ADVANCEMENT OF SCIENTIFIC INVESTIGATION

During the fifteenth year of The Ella Sachs Plotz Foundation for the Advancement of Scientific Investigation, seventy applications for grants were received by the trustees, thirty-three of which came from the United States, the other thirty-seven coming from eighteen different countries in Europe, Asia, Africa, Australia and North America. The total number of grants made during this year was thirty-two, one of these being a continued annual grant. Sixteen of the new grants were made to scientists outside of the United States.

In the fifteen years of its existence the Foundation has made three hundred and forty grants which have been distributed to investigators working in Argentina, Austria, Belgium, Brazil, Canada, Chile, China, Czechoslovakia, Denmark, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Iraq (Asia), Italy, Jugoslavia, Latvia, Lebanon (Asia), Netherlands, North Africa, Norway, Palestine, Poland, Portugal, Roumania, South Africa, Sweden, Switzerland, Syria, Venezuela and the United States.

In their first statement regarding the purposes for which the Fund would be used, the trustees expressed themselves as follows:

1. For the present, researches will be favored that are directed toward the solution of problems in medicine and surgery or in branches of science bearing on medicine and surgery.

2. As a rule, preference will be given to researches on a single problem or on closely allied problems; it is hoped that investigators in this and in other countries may be found, whose work on similar or related problems may be assisted so that more rapid progress may be made possible.

3. Grants may be used for the purchase of apparatus and supplies that are needed for special investigations, and for the payment of unusual expenses incident to such investigations, including technical assistance, but not for providing apparatus or materials which are ordinarily a part of laboratory equipment. Stipends for the support of investigators will be granted only under exceptional circumstances.

In the past few years the policy outlined in Paragraph 2 has been neglected. During the present great need for funds, grants will be given in the sciences closely related to medicine without reference to special fields. The maximum size of grants will usually be less than $500.

Applications for grants to be held during the year 1939-1940 must be in the hands of the Executive Committee before April, 1939. There are no formal application blanks, but letters asking for aid must state definitely the qualifications of the investigator and give an accurate description of the proposed research, the size of the grant requested and the specific use of the money to be expended. Only applications complying with the above conditions will be considered. It is highly desirable to include letters of recommendation from the directors of laboratories or clinics in which the work is to be done.

Applications should be sent to Dr. Joseph C. Aub, Collis P. Huntington Memorial Hospital, 695 Huntington Avenue, Boston.

RESULTS OF ARTIFICIAL PNEUMOTHORAX

Artificial pneumothorax has won a well-deserved reputation in the treatment of tuberculosis. Its shortcomings have been acknowledged though difficult to evaluate. Collapse therapy has now been in use sufficiently long to appraise its real value. Several workers have recently published their results and nearly all emphasize the point that many factors based on analysis of the cases must be considered in order to judge pneumothorax results fairly. One such review is that of Aycock and Keller (Results of artificial pneumothorax. Am. Rev. Tuberc. *38*:277-291, 1938) who analyzed the results of 530 cases of artificial pneumothorax treatment. Excerpts of their paper follow.

Bare composite percentage results in a group of cases do not reflect the true value of pneumothorax. To determine its efficacy the analysis must comprehend the varied pathologic manifestations. This review of 530 cases of artificial pneumothorax, induced at Fitzsimons General Hospital since 1931, undertakes the interpretation of results, primarily, on the basis of the dominant tissue reaction at the time pneumothorax was established.

Dominant tissue reactions can be embraced in three general groups: exudative, caseous pneumonic and fibrocavernous. All lesions of reinfection have their inception as an exudative process. Such lesions show a tendency toward resolution provided the issue is favorable. This group includes the lesion often designated as "soft." Regardless of extent, the exudative reaction must be looked upon as a phase in tissue response to tuberculous infection (or reinfection). Sooner or later some sort of proliferative response occurs in all such lesions. It seems more reasonable, therefore, to describe such tuberculous lesions, not as exudative, but as in the exudative phase. Many exudative lesions appear to clear up with slight residuals while many others progress to tissue destruction, replaced or circumscribed by fibrous tissue.

The caseous pneumonic group is distinguished from the exudative by its greater intensity and, in some cases, the extent of the tissue reaction. Conditions favoring the

origin of such lesions are those which effect a high and sudden concentration of tubercle bacilli within a tissue. Necrosis may follow with areas of excavation, and resolution is seldom more than partial.

In the fibrocavernous group the dominant tissue reaction at the moment is proliferative and represents an effort to repair or circumscribe tissue damage. Areas of cavitation enclosed by fibrous walls are part of the picture. Such lesions constitute a menace because they are potential chronic suppurative foci, which may act as sources for future spread of the tuberculous infection.

The authors apply the term "satisfactory collapse" to denote that the desired degree of collapse of the disease area was obtained, with the closure of cavities, if present. Sputum conversion was made a requisite for classifying treatment results as satisfactory in those cases still under collapse, or still in the process of re-expansion.

Of the total cases in which pneumothorax was induced, 301, or 57 per cent, were classified as "satisfactory collapse." All the minimal cases, — there were only 18, — 86 per cent of the moderately advanced and 45 per cent of the far advanced cases were in the "satisfactory collapse" group. These results confirm previous observations by many others to the effect that satisfactory results in pneumothorax diminish in proportion to the extent of the treated lesion.

Of the entire exudative group, 74 per cent showed "satisfactory collapse." This was principally because of the nature of the lesions and the low incidence of dense pleural adhesions or symphyses encountered. Of the caseous pneumonic group (25 cases), only 28 per cent were satisfactorily collapsed, and of the fibrocavernous group, mostly far advanced cases, 27 per cent were satisfactory.

The fact that by far the largest percentage of satisfactory results was obtained in the exudative group, prompts the authors to meet the argument that in this group there is a strong tendency toward spontaneous healing and that, therefore, many such cases will recover without collapse therapy. "On this point," say the authors, "there is no argument. The problem which confronts us lies in the determination of those cases which may or may not terminate favorably under expectant treatment. The characteristic of exudative lesions which admits of little argument is that they do not remain stationary, as such, for any considerable period of time. These lesions usually establish a trend, either progressive or recessive, in a very short time, so that no protracted periods of observation should be necessary to determine this point. As an illustration, many of our patients at Fitzsimons General Hospital are soldiers sent from distant stations, including our overseas garrisons. Transfer clinical records and x-ray films accompany these patients. In most of the cases showing exudative lesions, we are able to determine their trend upon arrival at this hospital by comparing our findings, clinical and x-ray, with those noted at the home stations of these soldiers."

It would seem, therefore, that the statistical argument in favor of artificial pneumothorax becomes strong in all exudative cases which have failed to establish a favorable trend. The contrast in the percentage of satisfactory results between far advanced cases of the exudative and fibrocavernous groups (62 and 27 per cent, respectively) leaves little to be said as to the choice of artificial pneumothorax as a therapeutic measure while the lesions are in the exudative phase. The percentage of satisfactory results in minimal and moderately advanced exudative cases should be even more convincing. In these groups, the highly satisfactory percentage results (100 and 88 per cent, respectively) were obtained with inconsequential risk of untoward complications. Furthermore, the mere fact that a case may be classed as minimal or moderately advanced does not mean that it lacks the potentialities of a progressive lesion. It often transpires that the minimal or moderately advanced exudative case of today will be a far advanced fibrocavernous case a year hence. It would seem that such a patient who has been following a "watchful waiting" policy has paid dearly for the delay.

The relatively poor percentage results shown for the fibrocavernous group do not mean that such cases should not be given the benefit of an attempt at artificial pneumothorax. However, it should be borne in mind in initiating the therapy in cases of this group that the chances of satisfactory results are less and that if a satisfactory collapse is obtained it must of necessity be maintained for a longer period of time than in the exudative cases. — Reprinted from *Tuberculosis Abstracts*, December, 1938.

NOTES

The award of James C. Melvin scholarships to the following students at the Harvard Medical School was recently announced: Bertrand E. Bennison 2M, of Newton; Kenneth T. Bird 1M, of Watertown; Tague C. Chisholm 3M, of Boston; Philip G. Creese 1M, of Danvers; David Dove 1M, of South Sudbury; Arthur R. Hartwig 2M, of Lawrence; Lawrence Kilham 3M, of Boston; Julian Nieckoski 2M, of Deerfield; Robert J. Tracy 1M, of Concord; Paul F. Ware 1M, of Clinton, and Earle H. Webster 3M, of Bridgewater.

The following appointments to the teaching and research staff of the Harvard Medical School have been recently announced: Lucie Adelsberger, of Berlin, Germany, as instructor in bacteriology, M.D. Friedrich-Alexanders University, Erlangen, '23; George Schlomer, of Berlin, Germany, as instructor in psychiatry, M.D. Munich '10; Charles R. Atwell, of Boston, as instructor in psychology, A.M. Harvard '31; George M. Wyatt, of Wilmore, Kentucky, as instructor in roentgenology, M.D. Western Reserve '33; Rupert A. Chittick, of Waverley, as assistant in psychiatry, M.D. Harvard '29; Thomas Colver, of Great Ormond Street Hospital, London, as research fellow in medicine, M.R.C.P. London '35; Kenneth M. A. Perry, of London, as research fellow in medicine, M.R.C.P. London '37; Rulon W. Rawson, of Chicago, Illinois, as research fellow in medicine and assistant physician to the Collis P. Huntington Memorial Hospital, M.D. Northwestern '38; Francis R. Dieuaide, of Peiping Union Medical College, Peiping, China, as research associate in biological chemistry, M.D. Johns Hopkins '20; Philip F. Partington, of East Orange, New Jersey, as research fellow in medicine, M.D. Harvard '35.

The appointment of Dr. Ella P. Cahill as senior psychiatrist in the Division of Mental Hygiene, Massachusetts Department of Mental Health, has been recently announced. Dr. Cahill, who was a junior psychiatrist in the same department, is a graduate of Tufts College Medical School. She succeeds to the position held by Dr. Olive A. Cooper, who has been made director of the Springfield Child Guidance Clinic, which is conducted at the Wesson Memorial Hospital under the sponsorship of the Department of Mental Health and the Springfield Community Chest.

Dr. A. Baird Hastings, professor of biological chemistry, Harvard Medical School, has recently been appointed to the Scientific Advisory Council of the Children's Hospital Research Foundation of Cincinnati, Ohio. The other members of the council are Drs. O. T. Avery, of New York City, E. W. Goodpasture, of Nashville, Tennessee, and A. N. Richards, of Philadelphia.

CORRESPONDENCE

TRANSFUSION OF INCOMPATIBLE BLOOD

To the Editor: Within the past two years it has been my sad privilege to see in consultation at five different hospitals in and around Boston as many serious transfusion accidents. The first four were fatal; the fifth undoubtedly would have been had not the surgeon immediately withdrawn the needle when the reaction occurred. *All these reactions were due to incorrect typing* and were not simply thermal, vasomotor or allergic reactions, which are not infrequently seen. Since this is solely my own experience, it is certain that other such serious accidents have occurred in this and nearby communities and that most of them have probably gone unreported. The importance of these cases cannot be overestimated.

In four of the five cases, only compatibility tests of the patient's serum against the prospective donors' erythrocytes were made. This is a dangerous practice and except in the most dire emergency should not be countenanced. In all cases, the patient and the prospective donors should be typed, and the apparently compatible donors should then be cross-matched with the recipient's serum. In this way, one will discard certain prospective donors whose red cells, although definitely non-compatible if tested with stock serums, show no *immediate* agglutination with the patient's serum. Certain patients have such a low titer of agglutinins and certain donors have such a low content of agglutinogens that a *simple test for compatibility may not bring out agglutination until after a period of thirty or sixty minutes* (using the slide technic). This was actually the case in one of the fatal instances, since later typing, using stock serums, demonstrated incompatible types, yet on repetition of the compatibility test no agglutination occurred on the slide for thirty or forty-five minutes. This patient died a uremic death. The delayed reactions in two other cases make me suspect that in all of them the same difficulty was present, namely delayed positive agglutination in testing for compatibility merely by direct matching.

Occasionally, a definite error will creep in even when both typing and cross-matching are done, as in the most recent case. Here the patient and donor were said to be Group O (Type IV) and cross-matching was said to be negative, yet the patient had an immediate and violent reaction. Repetition of the typing on the following day demonstrated that the patient was indeed Group O but that the donor was Group B (Type III). There was immediate macroscopic and microscopic agglutination so that only a gross error could explain the failure to establish the proper type.

In all these cases, with perhaps one exception, the typing was done by relatively inexperienced people, usually during the night and usually without supervision from the attending physician. In the last case, the intern stated that he had never learned the technic at his school, that three previous typings had gone along all right, that he had never observed a typing done previously and that he had simply followed along the procedure from the printed sheet supplied with the typing serums!

The increased use of transfusions (and of laboratory procedures in general) has placed the small private hospitals at a tremendous disadvantage. Almost without exception, they have few laboratory facilities and the existing ones are hopelessly inadequate. Trained technicians are almost never found, and if anything arises requiring other than the simplest and crudest laboratory tests, the patient is liable to suffer! I submit that this is an important and serious situation which warrants careful consideration from the Massachusetts Medical Society.

Blood typing preliminary to transfusion carries with it a definite sense of responsibility and can never be done too carefully. Both typing and cross-matching should be performed. The results should always be supervised by someone in the hospital who has had at least a moderate amount of training in the procedure and who appreciates the responsibility involved. Typing should not be left to poorly trained medical students, poorly trained interns, or technicians with limited experience. (At least the latter have, I find, a much greater sense of responsibility and are less apt to hurry things through in a slipshod fashion.) In compatibility tests, the preparation should be observed for at least a half hour before it is declared negative. Occasionally, the occurrence of circulating hemolysins, high titer of agglutinins, severe infection, and so forth, will interfere with the typing procedures. This may necessitate expert attention.

The whole subject of blood typing, transfusion methods, and so forth, might well be considered and taken up by a central committee of either the Massachusetts Medical Society or the Massachusetts Department of Public Health. Proper supervision of the laboratory work in certain of our small private hospitals is another and perhaps larger problem.

WILLIAM DAMESHEK, M.D.
371 Commonwealth Avenue,
Boston.

MEETING OF NATIONAL TUBERCULOSIS ASSOCIATION

To the Editor: The National Tuberculosis Association plans to hold its thirty-fifth annual meeting in Boston on Monday, June 26; Tuesday, June 27; Wednesday, June 28, and Thursday, June 29, 1939. The Program Committee wishes to make the meeting of interest not only to workers in the field of tuberculosis but also to doctors all over New England. It will help this committee in its work if the dates of June 26, 27, 28 and 29 are kept open for the National Tuberculosis Association by various local county and state medical societies.

REGINALD FITZ, M.D., *Vice-President,*
Boston Tuberculosis Association.
554 Columbus Avenue,
Boston.

BOSTON'S MORTALITY RATE IN TUBERCULOSIS

To the Editor: The recent release of the tuberculosis mortality statistics for 1937 for forty-six large cities of the United States, compiled by G. J. Drolet for the New York Tuberculosis and Health Association, yields some interesting information.

One of Dr. Drolet's tables computing death rates of cities on the basis of the mortality of the actual residents of each city, including the deaths of residents who, for one reason or another, die outside the city and *excluding* those of non-residents who happened to die within the city, presents an accurate picture of the tuberculosis mortality rate of each city.

This has resulted in some change in the relative positions in the ratings of cities as based on their tuberculosis mortality. It is gratifying to all who are charged with the responsibility of the tuberculosis situation in Boston to note that among the ten largest cities in the United States Boston leads, with a mortality rate of 56 per 100,000. In

the following order, come Pittsburgh and Los Angeles, each with a rate of 57; Detroit, 61; Chicago, 62; New York, 65; Cleveland and Philadelphia, 66; St. Louis, 67; and Baltimore, 101.

This achievement should serve as an additional stimulus to everyone to a more liberal purchasing of Christmas Seals.

H. F. R. Watts, M.D.,
Health Commissioner.

City Hall Annex,
Boston.

REPORTS OF MEETINGS

PLYMOUTH DISTRICT MEDICAL SOCIETY

A regular meeting of the Plymouth District Medical Society was held at the Plymouth County Hospital, Hanson, on November 17.

The society voted to conduct the survey on the adequacy of medical care in the district, as requested by the American Medical Association.

Dr. E. S. Bagnall, chairman of the Committee on Public Relations of the Massachusetts Medical Society, spoke on "Health Insurance and the Doctor." He stressed the difference between insurance against the loss of wages from illness and insurance against the cost of medical care. At the recent special session, the House of Delegates of the American Medical Association approved the principle of insurance against the cost of medical care. Dr. Bagnall discussed several existing medical-cost insurance plans, such as the one in operation for a number of years in Brattleboro, Vermont.

After the business meeting the society was entertained at luncheon by the staff of the Plymouth County Hospital.

BOSTON MEDICAL HISTORY CLUB

On Monday evening, November 21, Dr. Reginald Fitz, director of the Evans Memorial, Massachusetts Memorial Hospitals, spoke on the subject, "Honestly, Do We Teach as Well?" a subject based on a clinic such as William Osler would have given forty-one years ago.

Professor Richard H. Shryock of the University of Pennsylvania, who was to have been the speaker, unfortunately met with a severe automobile accident.

Benjamin Spector, M.D., *Secretary.*

EASTERN HAMPDEN MEDICAL ASSOCIATION

A stated meeting of the Eastern Hampden Medical Association was held on Thursday, November 10, at the Oaks Hotel, Springfield.

The paper of the evening, entitled "Modern Treatment of Hip Fractures," was delivered by Dr. Ira R. Calkins, of Springfield, and was illustrated by lantern slides. Dr. Calkins demonstrated the nailing of fractures of the femoral head and neck using the newly developed Engleman-May angle-finder, by means of which it is possible, in conjunction with the x-ray, to determine in advance the correct axis in which nails or pins should be driven through the fragments in order to obtain correct alignment. Since it is thus possible to obtain the correct angle of union, one pin or nail suffices for immobilization instead of the multiple nails used previously.

Drs. Erdix T. Smith, Frank P. Boyd and Ira R. Calkins were designated as delegates to the Springfield Council of Social Agencies as representatives of the Society.

NOTICES

AMERICAN BOARD OF OBSTETRICS AND GYNECOLOGY, INCORPORATED

The general oral, clinical and pathological examinations for all candidates, Part 2 Examinations (Groups A and B), will be conducted by the entire board, meeting in St. Louis, Missouri, on May 15 and 16, 1939, immediately prior to the annual meeting of the American Medical Association. Notice of time and place of these examinations will be forwarded to all candidates well in advance of the examination dates.

Candidates for re-examination must request such re-examination by writing the secretary's office before the following dates: Part 1—January 1, 1939; Part 2—April 1, 1939. Candidates who are required to take re-examinations must do so before the expiration of three years from the date of their first examination.

Application for admission to the Group A May, 1939, examinations must be on file in the secretary's office by March 15, 1939. Application blanks and booklets of information can be obtained from Dr. Paul Titus, secretary, 1015 Highland Building, Pittsburgh (6), Pennsylvania.

SYMPOSIUM ON MENTAL HEALTH

The Section on Medical Sciences of the American Association for the Advancement of Science will hold a Symposium on Mental Health, in conjunction with the annual meeting of the association, at Richmond, Virginia, on December 28, 29 and 30. The collaborating agencies include the American Psychiatric Association, the United States Public Health Service, the Mental Hospital Survey Committee, the National Committee for Mental Hygiene and a committee of eminent psychiatrists, headed by Dr. Walter L. Treadway, former assistant surgeon general.

The symposium will run for three consecutive days, with a morning and an afternoon session each day devoted to special topics, and a general evening session on the last day at which the total symposium proceedings will be reviewed. Unlike the usual scientific meeting, the majority of the communications will not be read at the meetings but will be published in advance in a series of six brochures, one for each session. These advance contributions will form the basis of the discussions. Each session will be arranged and conducted under the leadership of a section chairman who will summarize and critically analyze the individual papers, which will then be formally and informally discussed by persons selected by them, to whom the brochures will have been sent for study well in advance of the meeting. In addition, there will be opportunity for general, open discussion at each session.

Attendance is not limited to members of the association and its affiliated bodies. All who have a serious interest in the subject will be welcome—the lay public, as well as scientific and professional workers. All inquiries should be addressed to Paul O. Komora, administrative secretary, Symposium on Mental Health, 50 West 50th Street, New York City.

BOSTON CITY HOSPITAL

The monthly clinicopathological conference will be held at the Boston City Hospital on Wednesday, December 14, at 12 o'clock noon, in the Pathological Amphitheater.

Joseph E. Hallisey, M.D., *Secretary,*
Medical Staff.

FOURTH ANNUAL POSTGRADUATE INSTITUTE

The Philadelphia County Medical Society desires to announce formally, the completion of its scientific program for the Fourth Annual Postgraduate Institute to be held in the Bellevue-Stratford Hotel, Philadelphia, during the week beginning March 13, 1939. The subjects to be considered are those embraced by the terms "Blood Dyscrasias" and "Metabolic Disorders." These will be further subdivided for convenience in instruction into eighty-six clinical lectures, with open forum discussion for each topic, delivered by as many individual specialists of national distinction.

The pre-eminent position of Philadelphia as a medical center in the past has been justified by its large array of first-class hospitals and contributory institutions, and that conservative scholastic atmosphere so essential to careful and dependable research. Despite the development of medical centers in other areas, Philadelphia has continued to maintain its enviable position and it has been the desire of the Philadelphia County Medical Society to release to its own members and to those of the medical profession in general, the results of the labors so diligently conducted within the walls of the city's several medical schools.

The tremendous advances in the medical sciences since the World War have increased the demands of the lay public for medical information. The development of the channels for communication has familiarized the public with medical conditions and terms to such an extent that the physician must keep himself at least informed if not intensely educated concerning the most recent work in the medical field. He cannot conduct his practice along the older lines without continuing his education in the new.

The Postgraduate Institute aims to fill this need and the participants may be assured that they will unquestionably profit by the program to be presented. Address all inquiries to the Philadelphia County Medical Society, Twenty-First and Spruce streets, Philadelphia.

SOUTH END MEDICAL CLUB

The next meeting of the South End Medical Club will be held at the headquarters of the Boston Tuberculosis Association, 554 Columbus Avenue, Boston, on Tuesday, December 20, at 12 o'clock noon.

PROGRAM

The Health Program Under Social Security. Dr. M. Luise Diez.

Medical Legislation. Dr. Charles C. Lund.

Physicians are cordially invited to attend.

JOHN B. HALL, M.D., *Secretary.*

MASSACHUSETTS GENERAL HOSPITAL

The next meeting of the Hospital Research Council will be held in the Ether Dome, Massachusetts General Hospital, on Tuesday, December 13, at 5:00 p. m.

PROGRAM

The Role of Sulfanilamide in Antistreptococcal Immunity. Dr. C. Lyons.

Treatment of Gonorrheal Arthritis with Sulfanilamide. Dr. H. Coggeshall.

Excretion of Sulfanilamide. Dr. J. D. Stewart.

Effect of Sulfanilamide on Acid-Base Metabolism. Dr. W. Beckman.

HENRY K. BEECHER, M.D., *Secretary.*

NEW ENGLAND DERMATOLOGICAL SOCIETY

The next meeting of the New England Dermatological Society will be held at the Boston City Hospital on Wednesday afternoon, December 14, at 2:00.

The clinical meeting will be followed by dinner in the evening at the Hotel Kenmore, at which Dr. William Dameshek will discuss "The Relations of Hematology to Dermatology." This subject will be followed by a general discussion.

BERNARD APPEL, M.D., *Secretary.*

SCIENTIFIC EXHIBIT: AMERICAN MEDICAL ASSOCIATION

Application blanks are now available for space in the Scientific Exhibit at the St. Louis session of the American Medical Association, May 15 to 19, 1939. Attention is called to the fact that the meeting is a month earlier than usual, and applications close January 5, 1939. Blanks will be sent on request to the Director, Scientific Exhibit, American Medical Association, 535 North Dearborn Street, Chicago, Illinois.

MASSACHUSETTS SOCIETY OF EXAMINING PHYSICIANS

There will be a meeting and dinner for the Massachusetts Society of Examining Physicians at the Copley-Plaza Hotel on Wednesday evening, December 14, at 6:30. Dinner will be $2.50 per plate.

PROGRAM

Some Health Hazards in the Use of Radioactive Substances. Professor Robley D. Evans. Discussion opened by Dr. Channing C. Simmons.

A Comparison of the Practice of Medicine and the Practice of Law. Dr. William J. Brickley. Discussion opened by Attorney Thomas H. Mahony.

GEORGE W. MORSE, M.D., *President,*
WILLIAM P. COUES, M.D., *Secretary.*

MISSISSIPPI VALLEY MEDICAL SOCIETY 1939 ESSAY AWARD

The Mississippi Valley Medical Society offers a cash prize of $100, a gold medal and a certificate of award for the best unpublished essay on a subject of interest and practical value to the general practitioner of medicine. Entrants must be members of the American Medical Association. The winner will be invited to present his contribution before the next annual meeting of the Mississippi Valley Medical Society at Burlington, Iowa, September 27, 28 and 29, 1939, the Society reserving the exclusive right to publish the essay in its official publication—the *Mississippi Valley Medical Journal*. All contributions must not exceed 5000 words, be typewritten in English in manuscript form, be submitted in five copies, and be received not later than May 1, 1939. Further details can be secured from Harold Swanberg, M.D., secretary, Mississippi Valley Medical Society, 209-224 W. C. U. Building, Quincy, Illinois.

AMERICAN CONGRESS ON OBSTETRICS AND GYNECOLOGY

The first American congress devoted to a consideration of medical, nursing and other problems associated with human reproduction will be held in Cleveland, Ohio, from September 11 to 15, 1939, inclusive. It will be designated as the American Congress on Obstetrics and Gynecology.

The promotion and sponsorship of the congress has been delegated to the American Committee on Maternal Welfare, Incorporated. The latter includes the following organizations in its membership:

American Association of Obstetricians, Gynecologists and Abdominal Surgeons
American College of Surgeons
American Gynecological Society
American Hospital Association
American Nurses Association
American Protestant Hospital Association
American Medical Association, Section on Obstetrics and Gynecology
American Public Health Association
Central Association of Obstetricians and Gynecologists
Chicago Maternity Center
Maternity Center Association of New York
National Medical Association
National League of Nursing
National Organization for Public Health Nursing
New England Obstetrical and Gynecological Society
Pacific Coast Society of Obstetrics and Gynecology
Southern Medical Association
U. S. Bureau of the Census
U. S. Children's Bureau
U. S. Public Health Service

The purpose of this congress is to afford opportunities for discussing and publicizing the problems associated with human reproduction and the health of women and newborn babies. The value of more generally disseminated knowledge about the processes and problems of human reproduction and of the special diseases of the female generative organs and the newborn is important in the maintenance of public health and therefore the interest of woman's welfare extends not only to the medical profession but to associated groups, including nurses, public health officials, hospital administrators, eugenists and many others.

Problems develop with the expansion of knowledge and these can be discussed most effectively at a meeting where many viewpoints can be intelligently considered. Congresses, international and national, afford the means of presenting and discussing the advances in various fields of science and bringing them to public attention. Obstetrics and gynecology in particular demand that wide association with allied groups, aside from the practitioners of medicine, which is so essential to the progress and welfare of the public. For these reasons the scope of the projected congress has been extended beyond that of similar assemblies held in the past and will devote much attention to the wider public-welfare aspects of problems which have been considered frequently of purely medical interest.

National, sectional and local specialist societies have approved the congress and have made contributions for its support. It is desired that a wider representation be secured through the medium of contributing memberships, the cost of which has been placed at five dollars. Application may be made at the office of the congress, 650 Rush Street, Chicago, Illinois. Early application is desirable and will serve as an indication of personal interest in the success of the undertaking.

In addition to the scientific sessions it is planned to provide for several evening meetings at which speakers of prominence will discuss the broader aspects of the subjects for the lay public. There will also be prepared a comprehensive exhibit,—scientific, educational, technical and commercial,—which should add greatly to the general interest of the congress.

UNITED STATES CIVIL SERVICE COMMISSION EXAMINATIONS

Junior Medical Officer (rotating internship), $2000 a Year
Junior Medical Officer (psychiatric resident), $2000 a Year

The place of employment is to be St. Elizabeths Hospital, Department of the Interior, Washington, District of Columbia. Applications for these positions must be on file with the United States Civil Service Commission, Washington, District of Columbia, not later than December 13.

For the position of Junior Medical Officer (rotating internship) applicants must be fourth-year students in a grade A medical school. For the position of Junior Medical Officer (psychiatric resident) applicants must have successfully completed four years of study in a Grade A medical school subsequent to December 31, 1935, and they must have the degree of either B.M. or M.D. In addition they must have successfully completed an internship of at least one year, provided that applications will be accepted from persons now serving an accredited rotating internship.

Full information regarding these examinations may be obtained from the secretary of the United States Civil Service Board of Examiners, at any first-class post office, from the United States Civil Service Commission, Washington, District of Columbia, or from the United States Civil Service district office at Boston.

SOCIETY MEETINGS AND CONFERENCES

Calendar of Boston District for the Week Beginning Monday, December 12

Tuesday, December 13

*9-10 a. m. Boston Dispensary. Diagnosis of Certain Hip Conditions. Dr. J. D. Adams.
9:30 a. m. Massachusetts General Hospital. Thoracic Clinic, Ether Dome.
*10 a. m. - 12:30 p. m. Tumor clinic. Boston Dispensary.
5 p. m. Massachusetts General Hospital. Hospital Research Council, Ether Dome.

Wednesday, December 14

9 a. m. Massachusetts General Hospital. Cardiac Clinic.
*9-10 a. m. Boston Dispensary. Hospital case presentation. Dr. S. J. Thannhauser.
12 m. Boston City Hospital. Clinicopathological conference. Pathological amphitheater.
*12 m. Clinicopathological conference. Children's Hospital amphitheater.
2 p. m. New England Dermatological Society. Boston City Hospital.
6:30 p. m. Massachusetts Society of Examining Physicians. Copley-Plaza Hotel, Boston.

Thursday, December 15

8 a. m. Massachusetts General Hospital. Circulatory Clinic rounds.
8:30-9:30 a. m. Exchange visit, Surgical and Orthopedic Staffs of the Peter Bent Brigham and Children's hospitals, held this week at the Peter Bent Brigham Hospital.
*9-10 a. m. Boston Dispensary. The Use of Sulfanilamide. Dr. John Ferry.
10 a. m. Massachusetts General Hospital. Clinicopathological conference.
*10:30 a. m. Psychiatric Rounds. Boston City Hospital. Rounds will start at Room 916 on the ninth floor of the Medical Building.
11 a. m. Massachusetts General Hospital. Medical grand rounds.

Friday, December 16

*9-10 a. m. Boston Dispensary. Bence-Jones Proteinuria. Dr. Bernard Jacobson.
10 a. m. Massachusetts General Hospital. Fracture rounds.
*10 a. m. - 12:30 p. m. Tumor clinic. Boston Dispensary.
12 m. Clinical meeting of the Children's Medical Service, Massachusetts General Hospital, Ether Dome.

Saturday, December 17

*9-10 a. m. Boston Dispensary. Hospital case presentation. Dr. S. J. Thannhauser.
*10 a. m. - 12 m. Staff rounds at the Peter Bent Brigham Hospital. Conducted by Dr. Henry A. Christian.

*Open to the medical profession.

DECEMBER 13 — Massachusetts General Hospital. Hospital Research Council. Page 938.

DECEMBER 14 — Massachusetts Society of Examining Physicians. Page 938.

DECEMBER 14 — Boston City Hospital. Clinicopathological conference. Page 937.

DECEMBER 14 — New England Dermatological Society. Page 938.

DECEMBER 20 — South End Medical Club. Page 938.

DECEMBER 28-30 — Symposium on Mental Health. Page 937.

JANUARY 11 — Eastern Section of the American Laryngological, Rhinological and Otological Societies in conjunction with the New England Oto-Laryngological Society. Massachusetts General Hospital.

JANUARY 12 — Pentucket Association of Physicians, 8:30 p. m., Hotel Bartlett, 95 Main Street, Haverhill.

JANUARY 12 — Peter Bent Brigham Hospital. Clinic conducted by Dr. Christian. Page 633, issue of October 20.

FEBRUARY 4, MAY 15 and 16 — American Board of Obstetrics and Gynecology. Page 451, issue of September 22. (*Application for admission to Group A examinations must be on file in the Secretary's office by March 15, instead of April 1 as previously stated.*)

MARCH 13 — Fourth Annual Postgraduate Institute. Page 938.

MARCH 27-31 — American College of Physicians. Page 36, issue of July 7.

MAY 7-15 — International Congress of Military Medicine and Pharmacy. Page 501, issue of September 29.

MAY 15-16 — American Board of Obstetrics and Gynecology, Inc. Page 937.

MAY 15-19 — American Medical Association, St. Louis, Missouri.

JUNE 6, 7, 8 — Massachusetts Medical Society. Worcester.

JUNE 26-29 — National Tuberculosis Association. Page 936.

SEPTEMBER — Boston Psychoanalytic Institute. Page 450, issue of September 22.

SEPTEMBER 11-15 — American Congress on Obstetrics and Gynecology. Page 938.

SEPTEMBER 15-28 — Pan-Pacific Surgical Association. Page 863, issue of November 24.

District Medical Societies

ESSEX SOUTH

JANUARY 4 — Danvers State Hospital. Clinic at 5 p. m. Dinner at 7 p. m. Speaker: Dr. Kenneth J. Tillotson. Subject: The Psychiatrist's Viewpoint in Delinquency.

FEBRUARY 8 — Essex Sanatorium, Middleton. Clinic at 5 p. m. Dinner at 7 p. m. Speaker: Dr. Edward Churchill. Subject: Surgical Treatment of Pulmonary Suppuration.

MARCH 1 — Lynn Hospital. Clinic at 5 p. m. Dinner at 7 p. m. Speaker: Dr. John Rock. Subject: Endocrinology.

APRIL 5 — Addison Gilbert Hospital, Gloucester. Clinic at 5 p. m. Dinner at 7 p. m. Speaker: Dr. Ethan Allan Brown. Subject: Allergy.

MAY 10 — Annual meeting. Salem Country Club, Peabody.

SUFFOLK

JANUARY 25 — Symposium on Diabetes. Dr. Elliott P. Joslin and associates, Boston Medical Library, 8:15 p. m.

MARCH 29 — Joint meeting with New England Pediatric Society, Boston Medical Library, 8:15 p. m. Program and speakers to be announced.

APRIL 26 — Annual meeting in conjunction with Boston Medical Library, at 8:15 p. m. Election of officers. Program and speakers to be announced.

BOOKS RECEIVED FOR REVIEW

A Textbook of Biochemistry: For students of medicine and science. A. T. Cameron. Fifth edition. 414 pp. New York: The Macmillan Co., 1938. $4.00.

Practical Birth-Control Methods. Norman E. Himes with the medical collaboration of Abraham Stone. 254 pp. New York: Modern Age Books, 1938. 95c.

Tell Me the Truth, Doctor. Irwin I. Lubowe. 92 pp. Philadelphia: Dorrance and Co., 1938. $1.50.

Your Chest Should Be Flat: The deep chest makes better soil for tuberculosis. S. A. Weisman. 145 pp. Philadelphia, London, New York and Montreal: J. B. Lippincott Co., 1938. $2.00.

Marihuana: America's New Drug Problem: A sociologic question with its basic explanation dependent on biologic and medical principles. Robert P. Walton. 223 pp. Philadelphia, London, Montreal, Chicago, New York: J. B. Lippincott Co., 1938. $3.00.

Diseases of the Nose, Throat and Ear. W. Wallace Morrison. 675 pp. Philadelphia and London: W. B. Saunders Co., 1938. $5.50.

Cancer: Its diagnosis and treatment. Max Cutler and Franz Buschke. Assisted by Simeon T. Cantril. 757 pp. Philadelphia and London: W. B. Saunders Co., 1938. $10.00.

The Surgery of Oral and Facial Diseases and Malformations: Their diagnosis and treatment including plastic surgical reconstruction. George Van Ingen Brown. Fourth edition. 778 pp. Philadelphia: Lea & Febiger, 1938. $10.00.

Les Syndromes d'Imprégnation Tuberculeuse. René Burnand. 136 pp. Paris: Masson et Cie, 1938. 24 Fr. fr.

Synopsis of Clinical Laboratory Methods. W. E. Bray. Second edition. 408 pp. St. Louis: C. V. Mosby Co., 1938. $4.50.

BOOK REVIEWS

A Textbook of Gynecology. Arthur H. Curtis. Third edition. 603 pp. Philadelphia and London: W. B. Saunders Co., 1938. $7.00.

The first two editions of this book were considered satisfactory for the teaching of undergraduates. In the third edition eight chapters have been added. These, and the rewriting of a large part of the second edition, have greatly improved this excellent small book. The additions deal with anatomy, physiology and the endocrine glands. The anatomy is clearly presented, and many of the illustrations are original. In present-day teaching of gynecology, physiology plays an important role, and this branch of the subject, while condensed, is adequately considered. Since the endocrine glands have occupied a prominent place in gynecological literature of recent years, the well-prepared résumé of this topic is a distinct addition.

The neoplasms of the female pelvic organs, benign and malignant, are dealt with in a clear and graphic manner. The management of cancer of the uterus leaves nothing to the imagination, and irradiation in cancer of the cervix and surgery followed by irradiation in cancer of the uterine body, which are the accepted methods of treatment at the present time, are well presented. Although practically never employed now, the Wertheim operation is described and well illustrated, for the sake of completeness. Twenty-eight pages are devoted to tumors of the ovary, with a simple and concise classification; the rarer neoplasms of the ovary are discussed, the gross and microscopic illustrations being excellent. A consideration of radiotherapy and the early months of pregnancy from the gynecological point of view and the last chapter, dealing with operative management and postoperative care, enhance the value of the text. The volume is profusely illustrated by well-chosen and beautifully executed cuts.

The author has condensed the important facts of gynecology into a small and practical volume. While primarily intended for the medical student and the general practitioner, this book should prove to be interesting and valuable to the specialist in gynecology.

Refraction of the Eye. Alfred Cowan. 319 pp. Philadelphia: Lea & Febiger, 1938. $4.75.

Those who are familiar with the literature of refraction are aware that there is no superfluity of textbooks that attempt to establish clinical practice upon a thoroughly scientific basis. This book, therefore, coming from the pen of a teacher and long-time student of ophthalmic optics, merits close attention.

Most striking in a book on clinical refraction, and most commendable, is the preponderance of space given to opti-

cal theory. Only two of the nineteen chapters (66 out of 319 pages) are devoted to clinical methods. He who expects to learn a refraction-room procedure from these two chapters alone will be disappointed; and he should be, for, as the author says in his preface, clinical aspects are intended to emerge logically and in orderly sequence from their bases of scientific facts. The days are past when one can expect to prescribe lenses on the basis of a sheet of do's and don't's. Refraction is serious business. Boards of registration in optometry are already demanding satisfactory completion of a four-year, day course in an approved school. It is true that glasses which a patient will wear without complaint can in many cases be prescribed by an inadequately trained refractionist, but refraction rises to the dignity of an art only when its practitioners are firmly grounded on the basis of science. The doctor who has mastered the theory of optics as expounded in this book need have no feeling of inferiority in his groundwork.

A noteworthy feature of this book is its unity. The reviewer has found in it no trace of anything that could be called padding. He has kept to his proposition, not attempting to write a handy all-round manual for the ophthalmologist. Hence the principles of perimetry, the theories regarding the mechanism of accommodation and other germane but non-essential matters, ably treated in available textbooks, have been very properly omitted. The author, conscious of the scientific nature of his subject, has chosen to exclude what cannot be explained as scientific fact. It is for this reason that an intercalated page on "the associated muscle balance" appears out of harmony with the rest of the book. The treatment of the associated muscle balance is, or should be, a matter of profound concern to every refractionist. It is a great pity, to be sure, that refraction, which otherwise could be so delightfully scientific, has to be linked with physiological problems that are not reducible to formulas, but it is the opinion of the reviewer that the unpleasant fact must be faced; the associated muscle balance cannot be dissociated from the consideration of refraction and is no more compressible to the limits of a scant page than the subject of refraction — in the narrower optical sense — itself. Methods for measuring and interpreting the behavior of the ocular muscles certainly can claim a large place in a textbook of clinical refraction. A tolerable lens can frequently be prescribed without regard to the muscles, but the ideal lens — granting that there is an ideal lens for each eye — depends on the careful determination and evaluation of physiological as well as physical factors. There is an instructive chapter on contact glasses and telescopic spectacles, and a very useful bibliography.

The reading of this book is warmly recommended to every ophthalmologist and optometrist. Most readers will probably hurdle many of the pages, but as they run and skip they will not fail to gather much practical wisdom.

Endocrine Therapy in General Practice. Elmer L. Sevringhaus. 192 pp. Chicago: The Year Book Publishers, Inc., 1938. $2.75.

In the present-day status of confusion in endocrinology, this volume presents rather clearly a somewhat systematic approach to clinical endocrinology. The author is fully cognizant of the rapid development of the scientific laboratory work in the field and anticipates in a good many instances some of the problems in years to come. The work is lucid and short; being concise it is of value to the clinician who desires further insight in the field of endocrinology.

Outline of Roentgen Diagnosis: An orientation in the basic principles of diagnosis by the roentgen method. Leo G. Rigler. Exclusive text edition. 212 pp. Philadelphia, London, Montreal and New York: J. B. Lippincott Co., 1938. $6.50. Student edition $3.00.

This book is published in two editions — one with an atlas, the other without; otherwise they are identical. The text is exactly what the title indicates, that is, an outline of roentgen diagnosis. The descriptions and the differential points of diagnosis are brief and to the point and are arranged as a rule in order of importance. At the end of each section there is an estimation of the value of roentgenological examination in the given condition. Many of the illustrations are line drawings and not particularly helpful, and there is a noticeable lack of illustrations of different varieties of the same lesion and of the unusual conditions.

The value of such a book would seem to be chiefly in preparing a lecture or demonstration for students, with most of the facts summarized and available for quick reference. The book cannot be recommended as a comprehensive textbook.

The Surgery of the Sympathetic Nervous System. George E. Gask and J. Paterson Ross. Second edition. 191 pp. Baltimore: William Wood & Co., 1937. $4.50.

The authors have carefully reviewed the anatomy of the sympathetic system so far as it is known. Considerable stress has been laid on the physiological aspects, for without such knowledge pathologic conditions cannot be understood. Only those operations with which the writers have had experience or which they have investigated and found to be of value are mentioned. This second edition includes new material on clinical grading and the prognosis in Raynaud's disease, on the recognition of localized structural disease of the main arteries, on afferent pathways in the sympathetic system and on sympathectomy for dysphagia.

In each of the subjects covered, consideration is given to the experimental data pointing to the possible use of an operation, the difficulty in the selection of the proper cases for operation and the results of such operations. Sympathectomy is discussed for disorders of the circulation, for disorders of the visceral motor mechanism and for the relief of pain. The authors believe that the various conditions treated by sympathectomy and ganglionectomy are due to abnormalities of the organs themselves rather than to pathologic conditions in the sympathetic system.

Aids to Bacteriology. William Partridge. Sixth edition, revised by H. W. Scott-Wilson. 300 pp. London: Baillière, Tindall and Cox, 1938. (American agents, William Wood & Co., Baltimore.) $1.50.

This small handbook is one of many in the "Students' Aid Series" published by Baillière, Tindall and Cox, London, for the student preparing for examinations and for the practitioner as a means of brushing up. The principles of bacteriology, including general bacteriological methods, considerations of the various pathogenic bacteria, higher bacteria, fungi, protozoa and viruses, and the standard methods for the examination of sewage, water, milk, and so forth, are briefly summarized. The material is up to date, and surprisingly accurate and inclusive for a handbook of this type. The classification adopted by the Society of American Bacteriologists, in a slightly modified form, is used throughout. The book can be recommended for the purposes designated by the publishers.

Laboratory Manual of Hematologic Technic: Including interpretations. Regena C. Beck. 389 pp. Philadelphia and London: W. B. Saunders Co., 1938. $4.00.

In the foreword of this manual of hematologic technic it is stated that the author "has written the first comprehensive laboratory manual of hematologic technic for the medical technologist." Without doubt her statement is true, as the book is so comprehensive that at times it is quite redundant. Rather than calling it a book for the medical technologist, it should preferably be named "a manual for the student technologist." It is possible that this volume may be of service in teaching technicians the many problems involved in the laboratory study of hematology. At the end of each chapter a page is inserted for the student's jotting down of her own determinations, much in the manner of a student's laboratory notebook. In addition, there is a series of questions for the use of the instructor. Not infrequently one could take issue with statements made by the author as to the meaning of certain tests. It is highly questionable, moreover, whether the significance of laboratory tests should be taught to a technologist. The illustrations are passable, the English grammar atrocious. There is a good index at the end.

Diseases of the Nose, Throat and Ear: Medical and surgical. William L. Ballenger and Howard C. Ballenger. Seventh edition, thoroughly revised. 1030 pp. Philadelphia: Lea & Febiger, 1938. $11.00.

The new edition of this well-known work again lives up to the traditions of its predecessors. It is well written and systematic and has been brought up to date. It is a book not only for the ear, nose and throat specialist but for the general practitioner. There are a great many cuts, many of them new and all of them clear. There is little to criticize except that the various sections should have had a bibliography similar to the one on bronchoscopy and esophagoscopy. It is a pleasure to see that pathology is again beginning to resume an important place in a textbook of this type.

Surgical Pathology. William Boyd. Fourth edition. 886 pp. Philadelphia and London: W. B. Saunders Co., 1938. $10.00.

In the preface to the first edition of this work, published in 1925, the author wrote: "The object of this book is to present those aspects of pathology which will prove useful to the surgeon. . . . . the ordinary textbook of pathology . . . often lacks a detailed discussion of the very subjects regarding which he is seeking information. . . . The treatment of the various subjects may appear uneven, but this is because we have tried to maintain a reasonable balance between the common and important conditions and those which are rare and of less importance. . . . . the clinical features of most of the conditions have been summarized, so that the relation of the pathology to the symptomatology could be demonstrated."

The preface to the present edition lists the principal changes which have been made in the text, notably the inclusion of discussions of the grading of tumors, classification of ovarian tumors, diseases of the intervertebral disks, and such recently described entities as lymphogranuloma inguinale, regional ileitis, and tumors of the parathyroids and of the islands of Langerhans.

Difficulties must inevitably arise for the author of a book of this sort in defining the limits of surgery and of pathology. What conditions may be omitted? What diseases must be included? How much of chemistry, bacteriology, nutrition, symptomatology and even treatment are necessary to elucidate the pathology? Shall the emphasis primarily be placed on the gross or on the microscopic changes? While in general the author has met these problems fairly well, on several occasions we feel justified in offering some criticism. There is no mention of pulmonary disease, although tuberculosis, lung abscess, bronchopulmonary suppuration and pulmonary tumors have become of increasing surgical importance. Brief and almost incidental allusions are the only reference to such topics as hernia and ulcerative colitis. Cholangitis and stricture of the common bile duct are discussed, but there is only a meager reference to the liver changes characteristic of biliary cirrhosis, and none whatsoever to other types of cirrhosis. Esophageal varices are not mentioned, and although hematemesis is described in relation to Banti's disease, there is no attempt to explain its mechanism. Likewise there is no mention of peptic ulcer in relation to Meckel's diverticulum.

A general chapter deals with the subjects of inflammation and repair. One reads it in vain for information fundamentally vital to the surgeon: the mechanism of repair in wounds of the gastrointestinal tract, tendons, nerves, and so on; the reaction of the tissues to suture materials of various kinds; the fate of grafted tissues; the modifications of the repair process brought about by alterations in the nutritional or vascular status.

Another chapter on "The Surgeon and the Laboratory" contains much valuable information on collection of material such as blood, urine and pus for clinicopathological examinations. A very brief paragraph here refers to surgical material for histological examination. Unfortunately, there is no reference to biopsy. Certainly one should be entitled in a work of this sort to find a careful and detailed discussion of biopsy, including a critical evaluation of the newer methods of aspiration and punch biopsy.

The texts dealing with regional pathology are well written and readable. The material is valuable, and presented in an authoritative and rather didactic fashion. Controversial matters are omitted or frankly presented as such in most instances. Brief bibliographies attached to each chapter permit the reader to follow up more detailed information on interesting problems. The author apparently has very little enthusiasm for the grading of tumors. The new material on ovarian tumors may be helpful to the pathologist, but it does not seem to offer much to the operating surgeon. The book is profusely illustrated, and many of the illustrations are excellent. Photographs of preserved gross pathological specimens are customary in this sort of a book, but rarely reward the reader who is patient enough to try to understand them.

In summary, we are concerned with a one-volume textbook which covers many subjects of interest and value to the student and surgeon. Its popularity is attested by the fact that this is the fourth edition. Certain omissions of material detract somewhat from its value. The didactic and elementary presentation of the subject matter suggests that the work is written primarily for the medical student rather than the practitioner. The problem of teaching recognition of gross pathology to the operating surgeon remains largely unsolved.